

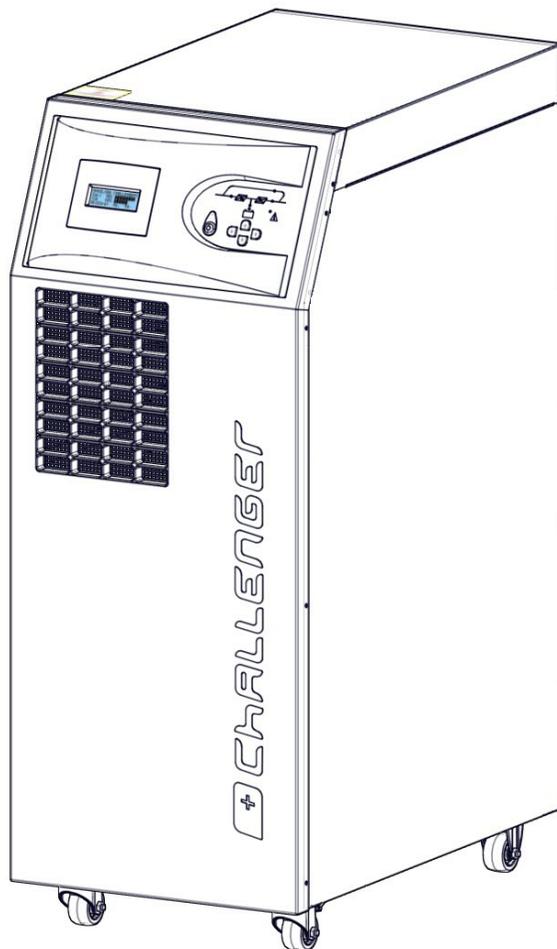
MAKELSON[®]

Uninterruptible Power Supplies

USER MANUAL

CHALLENGER SERIES

10 - 60 KVA



USER MANUAL

CHALLENGER SERIES

10 - 60 KVA

AG-SD-35

Document P. No:2 Rev:1

About the Manual

This Manual is prepared for the users of Challenger 10-60 kVA.

Companion Manuals

For more info about this device and its options, please visit www.makelsan.com.tr

Updates

Visit www.makelsan.com.tr for updates. Always use the latest manual.

Contents

1. Safety and Warnings	8
1.1 Warnings	8
1.2 Clearance and Access	9
1.3 Storage.....	9
1.4 Shipment	9
2. Product Description	10
2.1 General Information	15
2.1.1 Static Transfer Switch	15
2.1.2 Battery Temperature Regulation.....	16
2.2 UPS's Operation Modes	16
2.2.1 Normal (Online) Mode	16
2.2.2 Battery(stored) Mode.....	17
2.2.3 Bypass Mode.....	17
2.2.4 Auto Restart Mode	17
2.2.5 Maintenance Mode.....	18
2.3 Battery Management.....	18
2.3.1. Normal Operation Mode.....	18
2.3.2 Advanced Level Functions (Automatic Battery Test)	19
2.4 User Panel	20
2.4.1 Opening Screen	23
2.4.2 Main Menu.....	23
2.4.3 Navigation Through the Menus	23
2.4.5 Password-protected menus	24
2.4.6 Control Menu.....	24
2.4.7 Status Menu	25
2.4.8 Setup Menu	26
2.4.9 Logging Menu.....	28
3. Installation	29
3.1 Single Mode Installation.....	29
3.1.1 Pre-installation check up	29
3.1.2 Positioning	30

3.1.2.1 Positioning The UPS.....	30
3.1.2.2 Internal Battery Configuration.....	31
3.1.2.3 External Battery Configuration.....	36
3.1.3 Transportation Type of Cabinets.....	38
3.1.4 Main,Load and Battery Connections.....	39
3.1.4.1 External Protection.....	39
3.1.4.2 Cabling and fuse configuration.....	39
3.1.4.3 Cable connections.....	40
3.1.4.4 Battery connections.....	44
3.1.4.4.1 Internal Battery Installation Procedure and Connection.....	44
3.1.4.4.2. External Battery Installation Procedure and Connection.....	45
3.1.4.5 Control and Communication Cable Connections.....	47
3.2 Parallel Installation.....	47
4. Operation.....	50
4.1 Operation Procedure.....	50
4.1.1 Circuit Breakers.....	50
4.1.2 First Start-Up.....	51
4.1.3 Testing of Types of UPS Operation.....	54
4.1.3.1. Switching from Online Mode to Battery Mode.....	54
4.1.3.2 Switching from Online Mode to Static Bypass Mode.....	55
4.1.3.3 Switching from Static Bypass Mode to Online.....	55
4.1.3.4 Switching from Online Mode to Maintenance Bypass Mode.....	56
4.1.4 Perfoming a Complete Shut Down.....	58
4.1.5 EPO (Emergency Power Off).....	58
4.1.6 RS232 Serial Communication Installation and Investigation.....	59
5. Explanations of Logging.....	60
6. Technical Specifications.....	69
7. CONTACT INFORMATIONS.....	71

1. Safety and Warnings

1.1 Warnings

This manual must be read before installing the UPS. The device can be installed and started only by MAKELSAN staff.

Installation or start-up by unauthorized personal may cause damage to the device and serious injury or death.

The UPS is designed to be used in continuous vertical fixed position applications.

Warning:



THE UPS MUST BE USED WITH GROUND CONNECTION.

Connect the ground cable before connecting the mains.

Ground currents may be as high as 0.4A



THE UPS MUST BE DISCONNECTED FROM THE MAINS AND BATTERIES BEFORE SERVICING. ALSO WAIT FOR AT LEAST 5 MINUTES FOR THE DC BUS CAPACITORS TO DISCHARGE AFTER POWER OFF.

Service-Maintanance

All servicing and maintenance is done internally. All parts in the device can be serviced and replaced only by a trained technician.

Preventative maintenance is recommended at least once a year from the installation by authorized technical staff .(This service will be provided for a fee by our authorized MAKELSAN staff.)



Battery Voltage may rise up to 450V DC!

Battery terminal voltages can be at hazardous levels (450Vdc). Nobody except trained staff should touch batteries.

Batteries certainly must not be thrown into fire. Regarding the topic of batteries which are dead and defected: The waste batteries must definitely not be thrown to nature. They must delivered to MAKELSAN authorized technicians or to the foundations which are authorized for collecting waste batteries by the Ministry of Environment.

Fire extinguishing equipment must be kept nearby the UPS.

1.2 Clearance and Access

Clearance

There is no any air inlet or outlet grill on the left or right sides of our 10-60 kVA UPS. All air goes in to UPS from the front and is evacuated from the rear through fans. There must be spaces at least 1 meter for UPS's front side and 1,2 meter at the back side. Should not be permanent or temporary use within the limits specified. Otherwise, the UPS performance will decrease.

Access

Operator reaches UPS via front panel on 10-60 kVA UPS. Therefore, enough area must be left for operator. Also, UPS can be intervened in the back of it for service and maintenance. Because of this reason , enough area for personal must be left at the rear side of UPS. There is no limit to the sides of the device.

1.3 Storage

UPS should be kept in a room or area where is protected from excessive moisture and heat before commissioning..

WARNING:

Unused batteries must be charged at regular intervals. This time interval is determined by the battery supplier. Charging can be performed periodically by connecting to a proper mains for a while.

1.4 Shipment

Carrying vehicles must have enough features and characteristics to carry UPS.

Cabinet is equipped with four-wheel. In this way, it can be placed by moving easily. These wheels are used only smooth surfaces.

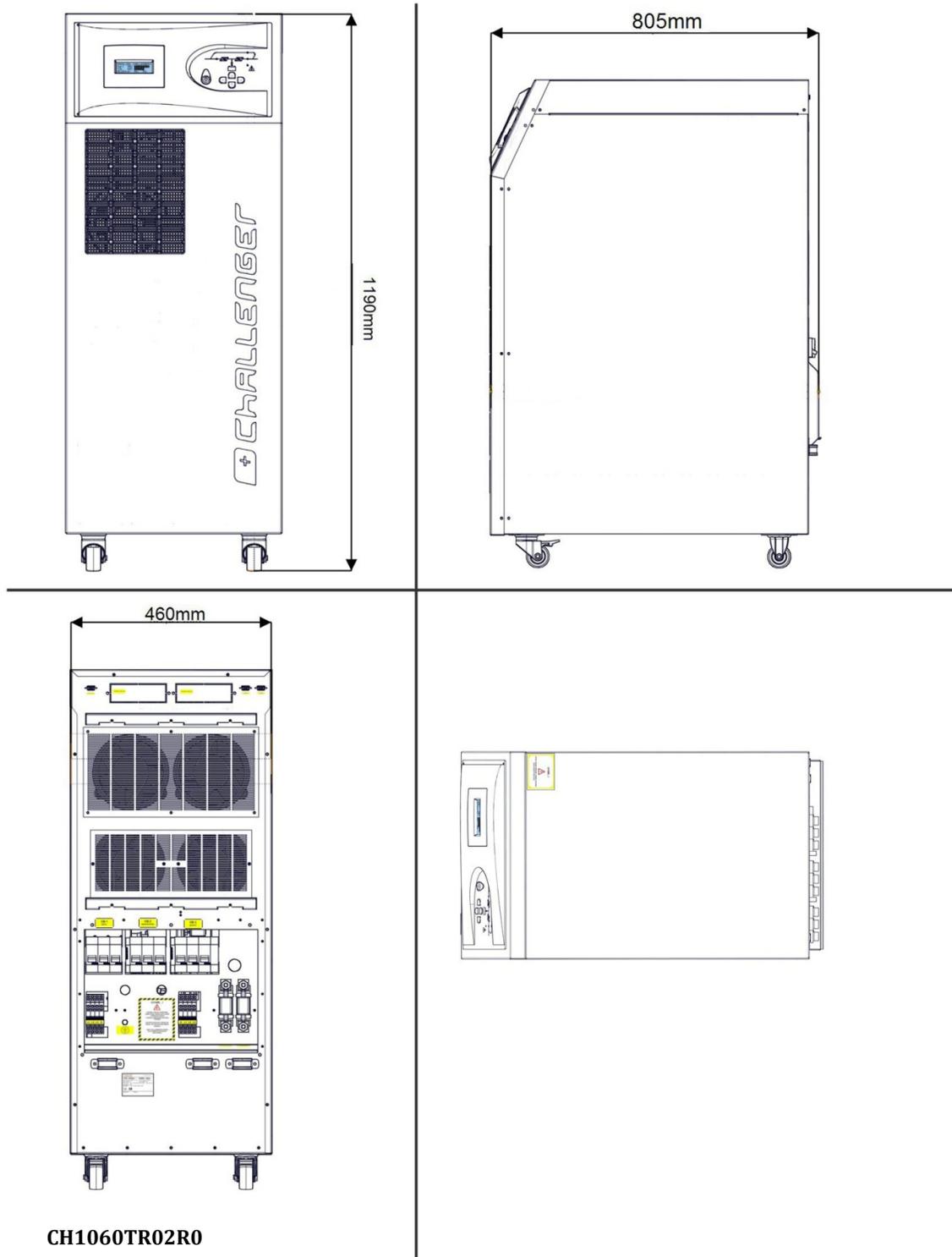
The rear wheels of UPS must be locked after positioning properly.The rear side wheels are fixed.

Be more careful of sudden movements ,especially when batteries are inside of cabinet.

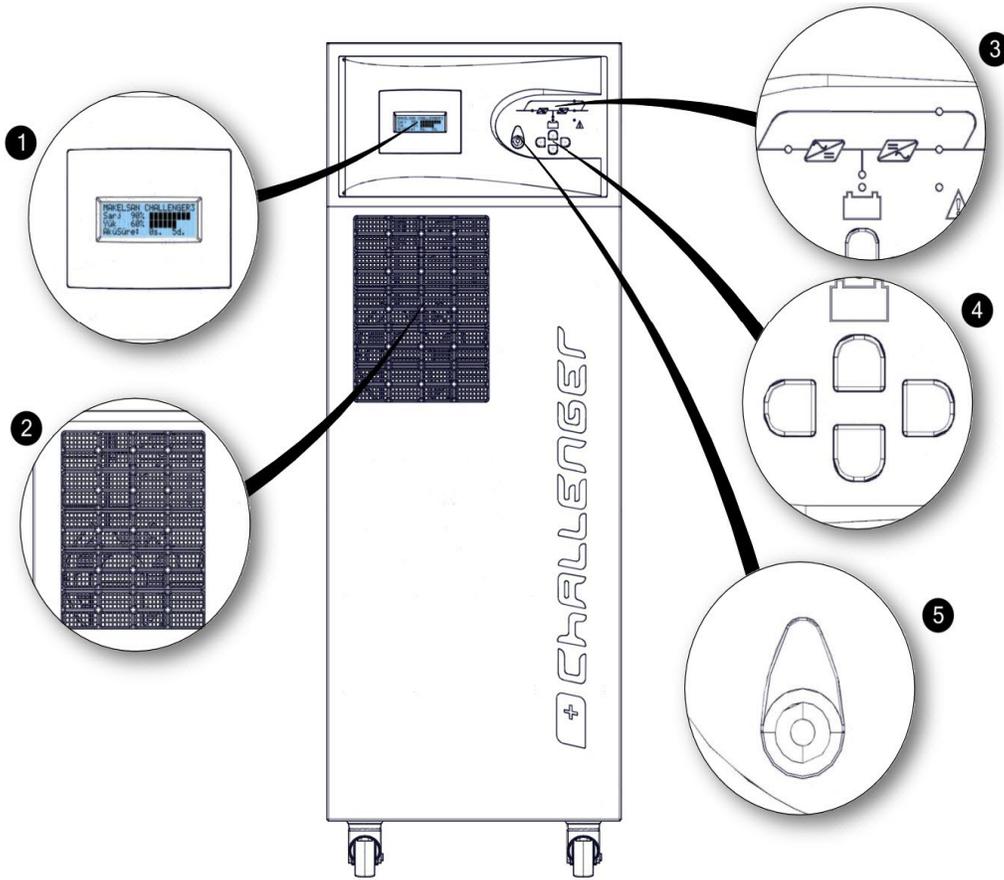
Move the UPS as rarely as possible.

2. Product Description

General View



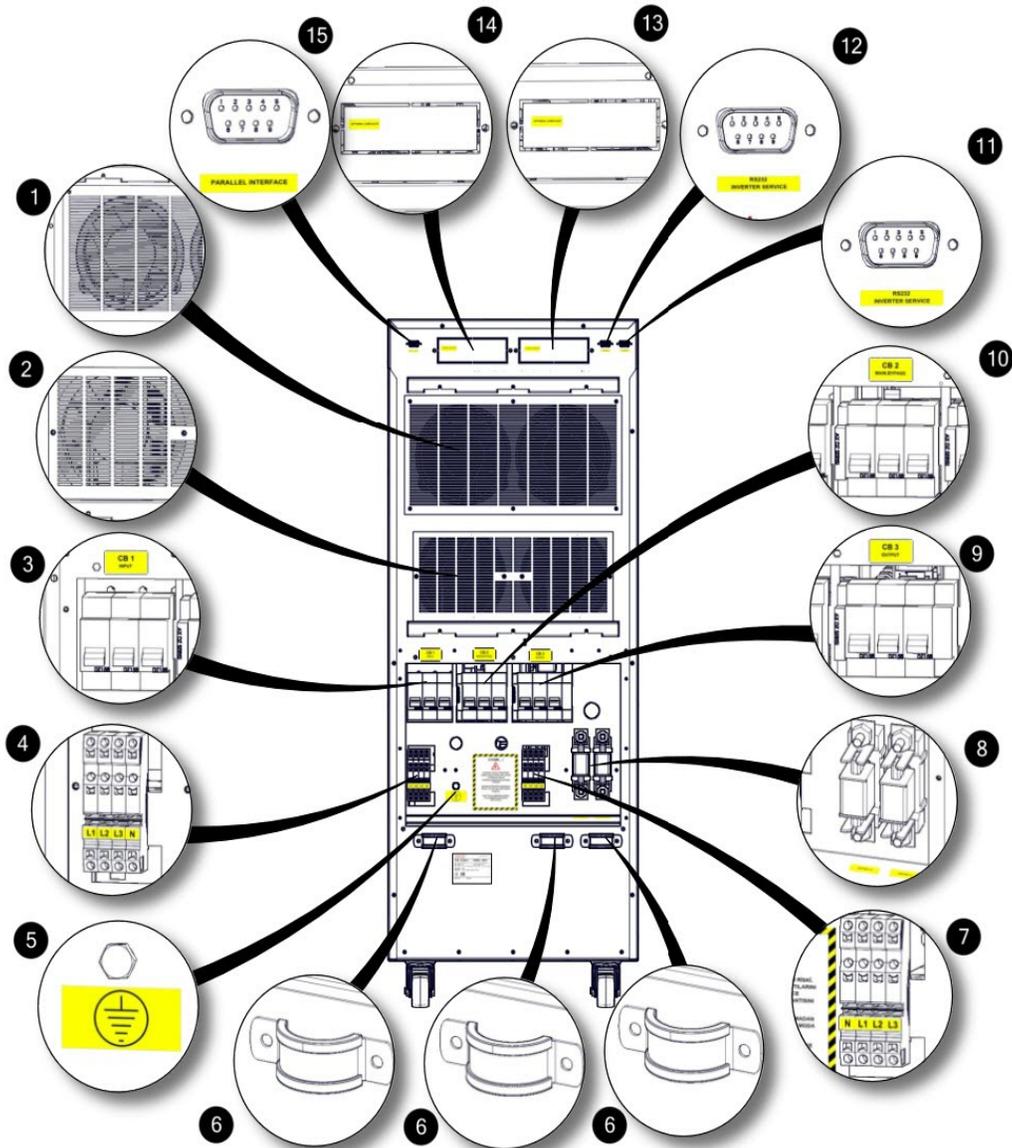
Front view



CH1060EN03R0

1	4x20 Karakter LCD Ekran
2	Ventilation Inlets
3	Mimic Diagram
4	Menu Keys
5	EPO (Emergency Power Off) Button

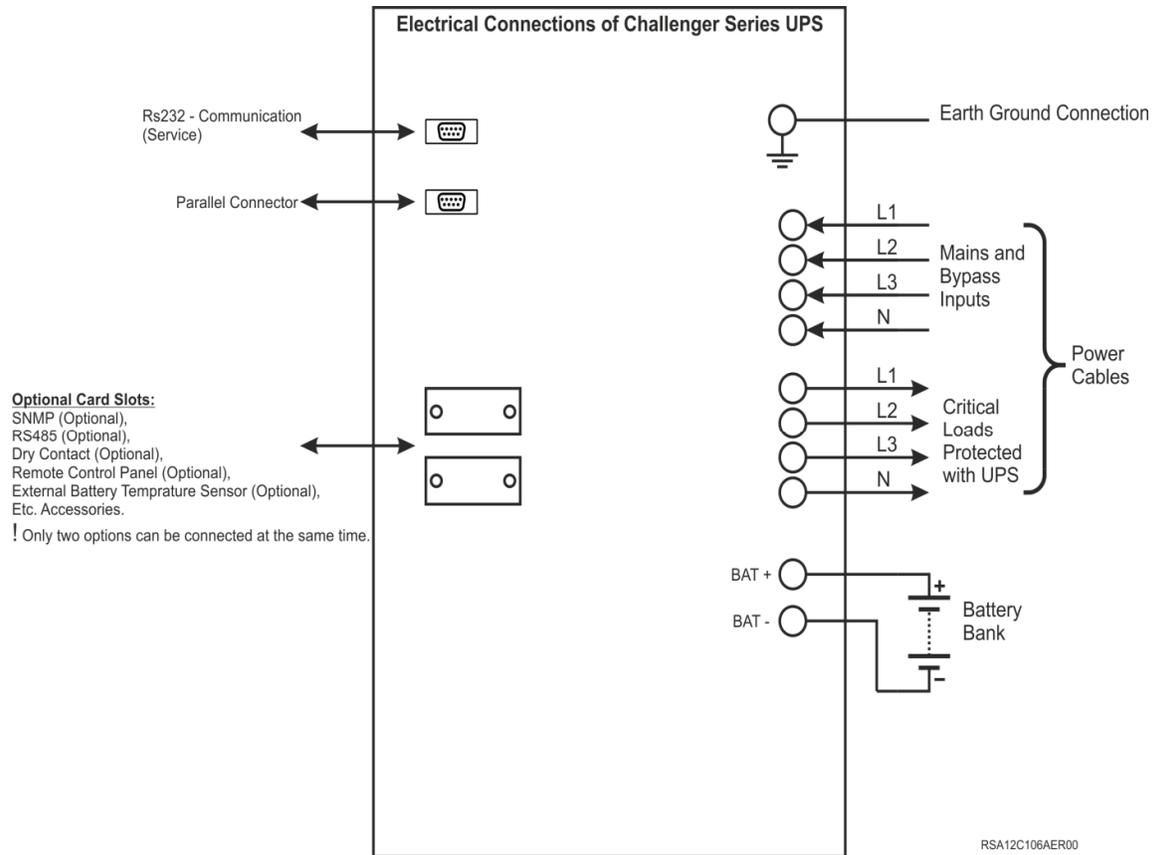
Rear view



CH1060EN04R0

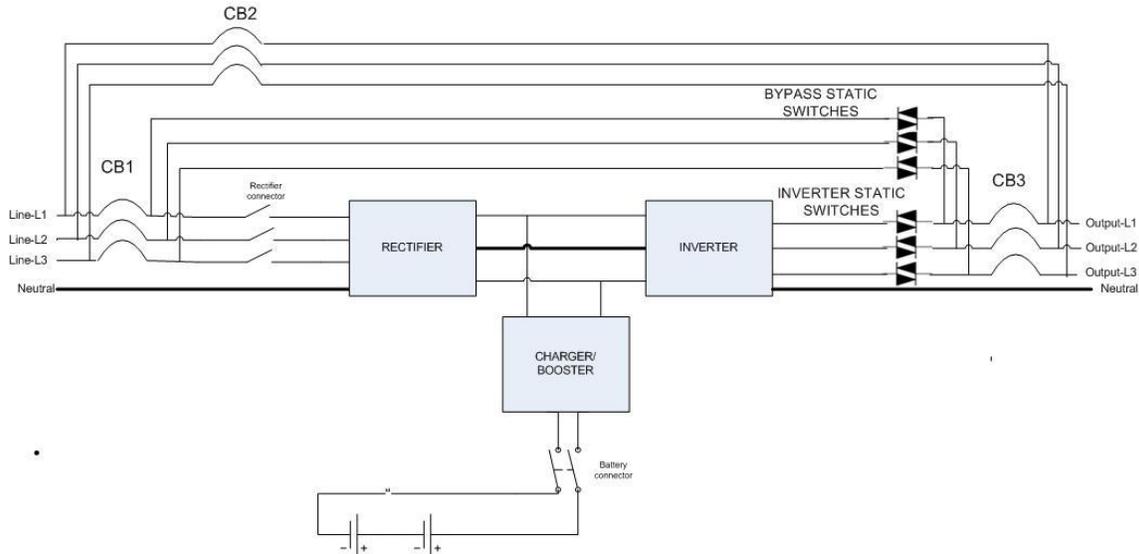
1	Rectifier / Charger-Inverter Cooling Fans
2	Winding Hot Air Evacuation Channel
3	Mains (Input) Breaker
4	Mains (Input) Connection Terminal
5	Ground Connection
6	Input-Output-Battery Cable Fixing Terminals
7	Output Connection Terminals
8	Battery Rapid Fuses and Battery Connection Terminals
9	Output Circuit Breaker
10	External (Maintenance) Bypass Breaker
11	RS232 Terminal for Communication Socket of Rectifier
12	RS232 Terminal for Communication Socket of Inverter
13	Optional card slots
14	Optional card slots
15	Optional Parallel Port Terminal

Electrical Connection



2.1 General Information

General operation topology of Challenger® Series UPS can be recognized as follows:



The UPS is connected to the mains voltage through the CB1 breaker. As DC bus is ramped up, the rectifier starts to operate and converts the AC mains to DC voltage. When the mains voltage is not available, the DC/DC booster pumps the battery voltage to the necessary level. DC DC bus voltage is then converted to mains synchronized AC voltage by the inverter. This is a high quality voltage. Generated AC power is applied loads after static semi-conductor switches and output (load) breakers.

2.1.1 Static Transfer Switch

Some blocks are named as “static switches” as can be seen above. These blocks consist of inverse parallel connected thyristors. These switches, which are under the control of the mainboard control unit (DSP), provides controlling of supplying the loads through either mains or inverters. The loads are supplied through inverter during the normal operating mode. Therefore, Inverter static switches are active if there is no problem with the system.

System provides the loads to be fed smooth and seamless by mains or inverter. In order to manage his process at minimum risk, UPS synchronizes the inverter output and static (mains) bypass as phase and frequency. Therefore, Inverter frequency can be considered as mains. It is the same as mains frequency as long as it is within frequency limit.

User can switch the UPS between mains and inverter by using front panel. While the loads are fed directly by mains with the order of user, in case of either power off or mains values out of tolerances, the UPS will start to supply the loads through battery mode.

If the user wants, can provide mains to feed load continuously by switching on the maintenance bypass without making adjustment on the front panel. Later on, the user can make the input and output switch fuses short circuit.

In case of any need for maintenance or repairing, maintenance circuit breaker must be turned ON before the input or output circuit breakers turned ON. Then, first UPS's output must be turned OFF, secondly input circuit breaker must be turned OFF.

NOTE: In the meantime, the loads are unprotected against the power-off, damage, twist etc. problems.

2.1.2 Battery Temperature Regulation

10-60 kVA UPSs have their own place for internal batteries. These battery temperature are perceived by "temperature sensor". UPS adjusts battery charge parameters according to the information of the detected temperature. These parameters can easily be adjusted via LCD or TELNET interface by authorized staff of MAKELSAN.

Temperature sensor is given as optional with external battery cabinets. UPS regulates charge parameters in the same way by this sensor. In this case, We recommend you to order "**Battery Monitoring Kit**" to detect the temperature.

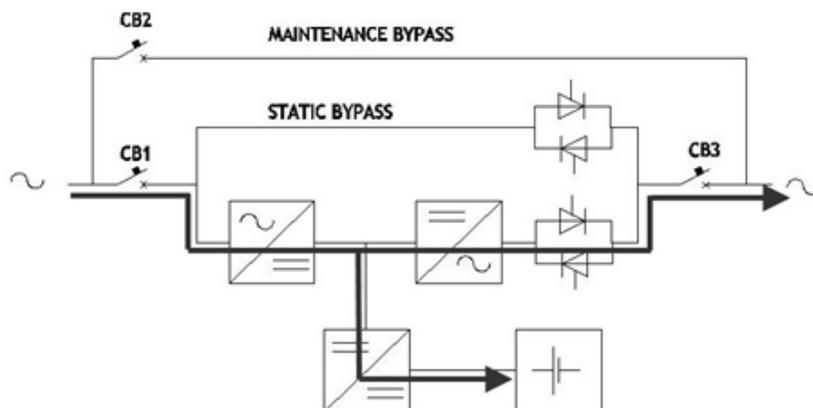
2.2 UPS's Operation Modes

Challenger series UPS's on-line and has a double loop structure. Our products operate in the following modes:

- Online Mode
- Battery Mode
- Bypass Mode
- Auto Restart
- Maintenance Mode

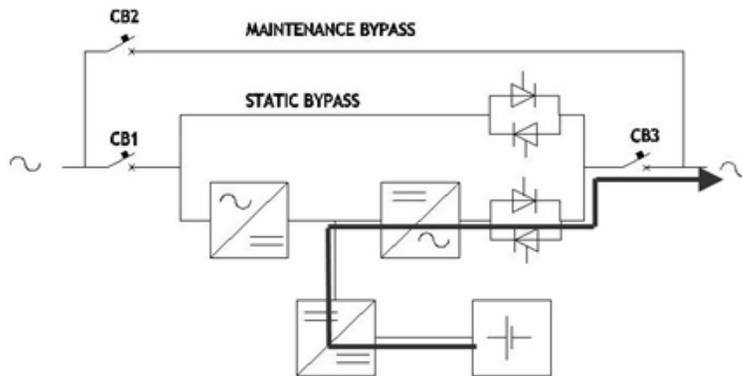
2.2.1 Normal (Online) Mode

In this mode, UPS supplies the load through the inverters. Rectifier unit is supplied by the AC mains. Inverter and battery charger units are energized by the generated DC supply.



2.2.2 Battery(stored) Mode

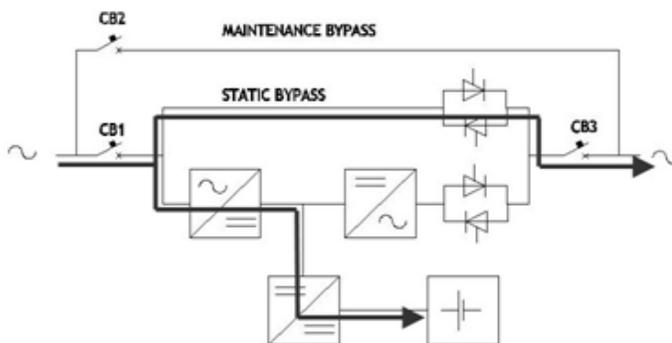
UPS runs on battery mode when the mains voltage is bad. Battery Voltage is boosted for the sufficient Dc bus voltage. In order to provide proper DC Bus voltage, battery voltage will be boosted.



2.2.3 Bypass Mode

In an overload condition, or if there is a problem with the double conversion, the loads are fed by the bypass line.

UPS switches to AC supply from inverter for that by static switches. Inverter must be synchronized with the mains supply for these transitions to be seamless. This transition might take 15 ms depending on the type of load if inverter output is not synchronized with the mains.

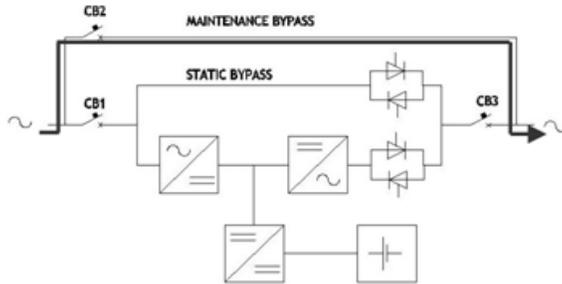


2.2.4 Auto Restart Mode

UPS supplies its critical loads up to end of discharge voltage level due to any mains failure. UPS feeds critical loads until end of battery discharge voltage level caused by any mains failure. UPS will operate until batteries charging process completing after that will be switched off. UPS can operate by itself in specified time after mains turned back to normal mode. In this case, UPS keeps operating proper as long as UPS voltage being in accordance criteria. For Challenger Series UPS, this feature is not activated as factory initial setups.

2.2.5 Maintenance Mode

In maintenance mode, the loads are switched to the maintenance bypass line with a breaker, so that the UPS can be serviced without cutting off the power flow to the loads.



2.3 Battery Management

Lead - Acid Batteries are used with UPSs as internal with variable configurations.

2.3.1. Normal Operation Mode

Constant Charge Current

Current is limited to 0.1C until the float reaches to charge voltage. (adjustable between 0.05C - 0.25C.) The applied current can not exceed maximum charge power.

Float Charge

Depending on the battery discharge current the third percent energy of the battery is charged at this level. Thanks to this level, batteries are kept ready for use at the highest capacity. For lead-acid batteries, this voltage varies between values 2.2-2.35 V/cell This voltage may differ slightly with temperature adaptation. Option of setting this coefficient is provided with our UPS. If the temperature sensor is used, it is recommended to use.

Deep Discharge Protection

While the system operates on battery mode, if battery voltage has dropped below the discharge level UPS shuts down and stops absorbing energy from the batteries. This value varies between 1.6-1.75 V/cell for Lead-Acid batteries, and for Ni-Cd batteries between 0.9-1.1 V / cell.

Low Battery Warning

While the system operates in battery (stored) mode, according to actual loads if the battery capacity drops below its 40% value, it will give audible and visible alarms. This percentage value is adjustable for user between 20%-70%.

2.3.2 Advanced Level Functions (Automatic Battery Test)

The auto battery test discharges 30% of the battery energy in a user defined period (default is 90 days). This period can be adjusted between 30-360 days. Test reports the battery condition as “**good or replace**”. Results of the latest test can be seen on the battery screen from the status menu.

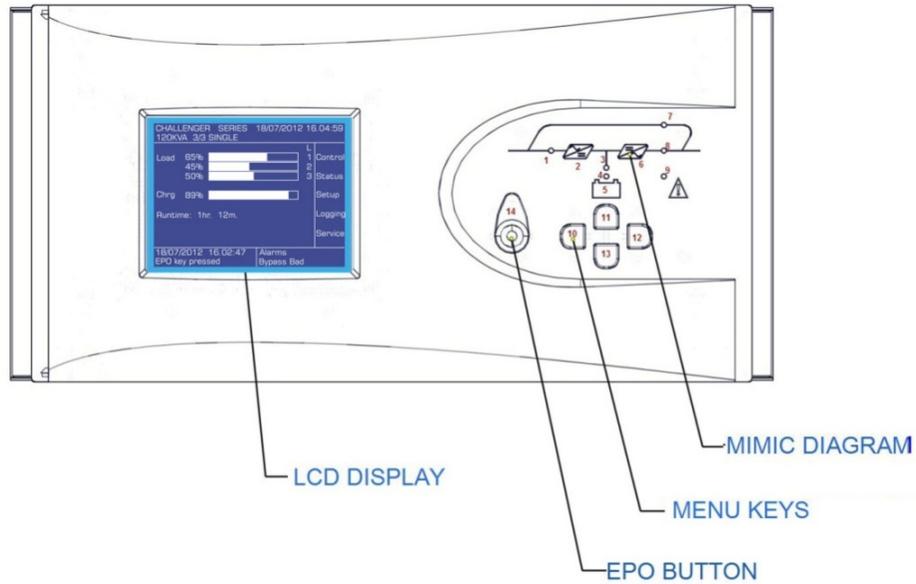
WARNING: If the test result is “**replace**”, then the batteries are completely drained during the test. This situation may cause the load remained unpowered in case of mains voltage is out of the limits or mains power off.

This test can be started by command from front panel monitor, via TELNET interface, via RS232 smart communication or via MAKNET (SNMP, see the options).

It is checked that if the batteries can supply the minimum back-up time needed in case of the first power-off by using the results of all these tests. Checking the test results with a regular period is recommended.

2.4 User Panel

User panel consists of mimic diagram, LCD screen, EPO button and menu keys. The UPS can be controlled via this panel.

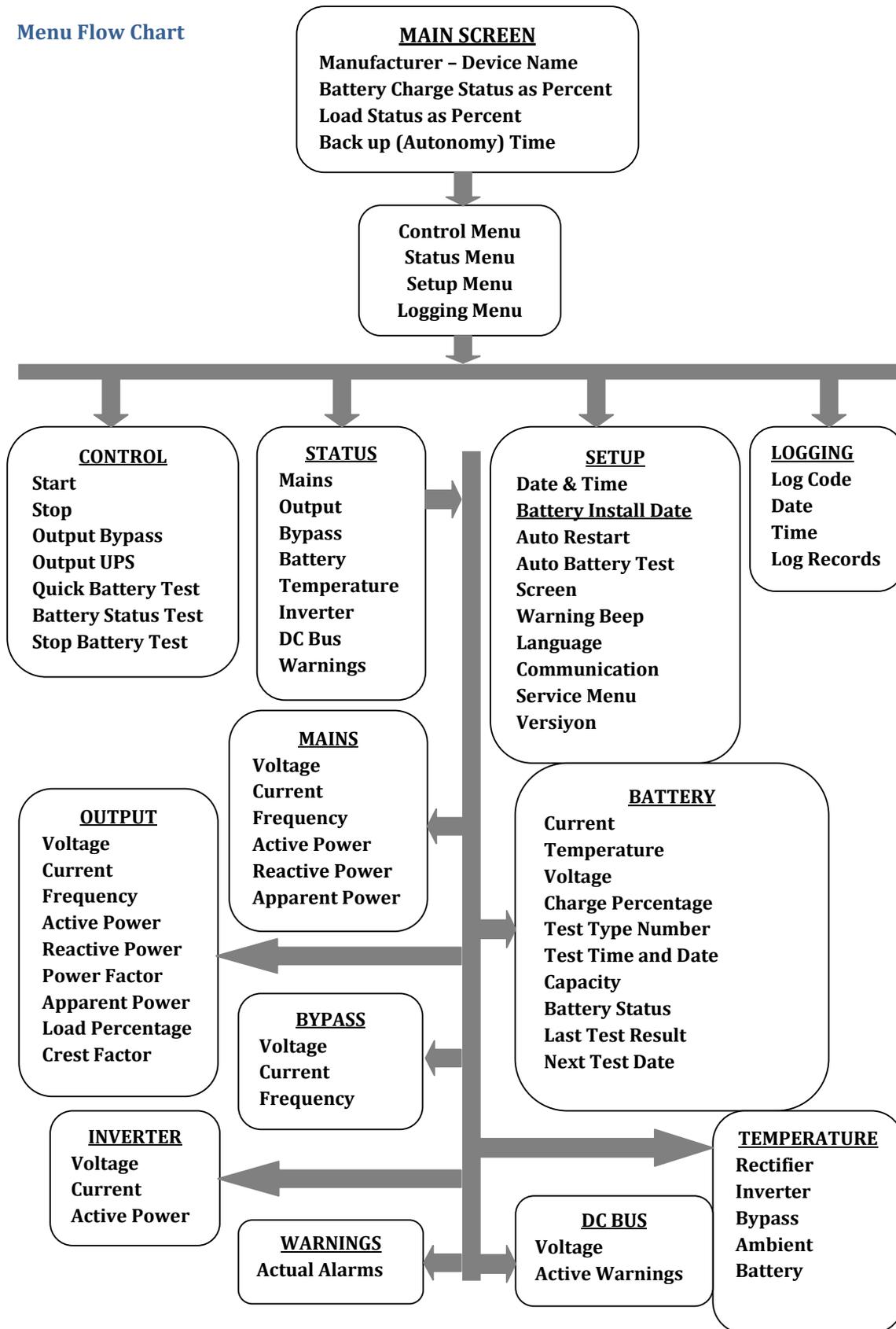


CH1060EN05R0

1	Rectifier indicator LED Flashes while the DC bus is ramping up. Illuminates when Rectifier works.
2	AC/DC module (Rectifier)
3	Boost mode indicator LED Illuminates in battery mode. Flashes when UPS is started up through batteries.
4	Battery charge indicator LED Illuminates while the batteries are charging.
5	Battery module
6	DC/AC module (Inverter)
7	Mains bypass indicator LED Illuminates while the loads are fed through bypass line.

8	Inverter static switch indicator LED Illuminates when the load is fed by the inverter
9	Alarm/Warning indicator LED
10-13	Menu keys
14	EPO (Emergency Power Off) Button

Menu Flow Chart



* Detailed service menu can be opened only by authorized service personnel

2.4.1 Opening Screen

Opening screen is on when the display interface is not being used. It shows the model name, charge and load percentage and remaining runtime. In case of an alarming condition, alarms are shown on the first row. If no button is pressed for 5 minutes, device returns to the opening screen.



2.4.2 Main Menu

To switch from opening screen to the Main menu, press enter.



2.4.3 Navigation Through the Menus

Use up and down keys to move the cursor arrow. Press enter to open a sub-menu. Press ESC to go back to the previous menu. Control sub-menu is shown next.



Some sub-menus may have more than one screen. Keep pressing up or down key to get to the next screen.



Some menus have changeable options like ON/OFF, durations or quantities. To change something in such a menu press ENTER, to choose the variable, up and down keys to change the value, and press ENTER, to set the new value. Press ESC to cancel.



2.4.5 Password-protected menus

Some menus such as the control menu are password protected. Press up and down keys to set each digit and press ENTER to confirm.

User level password is "0000".



2.4.6 Control Menu

Within the control menu, you can do one of the following:

- **Start** Start the UPS
- **Stop** Stop the UPS
- **Switch to BYPASS** Switch to static BYPASS mode
- **Switch to UPS** Switch to online mode
- **Bat. Quick Test** Start the quick battery test
- **Bat. Capacity Test** Start the deep battery test
- **Stop Battery Test** Stop the battery test

Battery status test, drains the 10% of battery energy and reports batteries which has more capacity than 10% as "**Good**", less capacity than 10% as "**Replace**" according to the test results.

Deep battery test uses all the battery energy and states the actual battery capacity as percentage (%)

Note: Batteries must have been fully charged and kept in floating situation for at least five hour before performing the battery tests.

See **Status > Battery > timer** to find out how many minutes are left.



If "**Stop Battery Test**" is chosen from the menu, the UPS cancels the battery test goes back to the previous operating state.

2.4.7 Status Menu

You can see information about the mains, output, bypass line, battery, temperature, inverter, DC bus and alarms on this menu.



Main

VP, A Hz	<i>Voltage, current and frequency of each phase..</i>
KW, KVA, PF	<i>Active power, apparent power and power factor of each phase.</i>
Pt, St, VL	<i>Total active and apparent power.</i>

Output

VP, A, Hz	<i>Voltage, current and frequency of each phase</i>
KW, KVA, PF	<i>Active power, apparent power and power factor of each phase</i>
Pt, St, %L	<i>Total active and apparent power, and load percentage of each phase</i>
VL, CF	<i>Voltage of each phase (phase-neutral) and crest factor.</i>

Bypass

VP, A Hz	<i>Voltage, current and frequency of each phase</i>
VL	<i>Voltage of each phase (faz-faz).</i>

Battery

A, °C, V, Şarj%	<i>Charge current, temperature, voltage and charge percentage</i>
SXXXX, GG/AA/YY,	<i>Test type, test number, test date and time. Battery capacity and condition.</i>
SS: DD, capacity condition	
Next Test, time	<i>Next test date, timer countdown for the next test availability</i>

Temperature

°C, °C, °C, °C, °C	<i>Rectifier, inverter, charger, ambient, battery and thyristor temperatures.</i>
--------------------	---

Inverter

VP, A, KW	<i>Voltage, current and frequency of each phase..</i>
-----------	---

DC Bus

P, N	<i>N to DC+, DC- to N voltages. Charge Voltage.</i>
------	---

Alarms

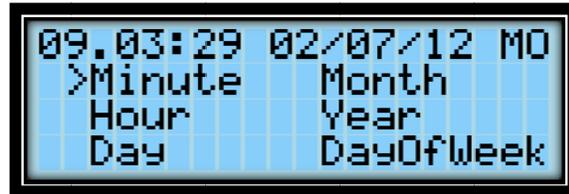
UPS alarms

2.4.8 Setup Menu

Setup menu consists of the following :

Date&Time

To set date and time, use up and down keys to choose the variable you want to set.



Then use up and down keys to set the value, and press enter.



Battery install date

Use this menu to set the battery install date, only when new batteries are installed.



Auto restart

In battery mode, the device turns off at the end of battery discharge. Auto-restart can be used to restart the UPS automatically when the mains comes back to limits.

Turn on auto-restart and set the time to define when the device will be started after the mains is normal.



Battery self test

This function can be turned on to start the user independent battery tests.

Time interval sets when the test will be repeated.

Note: Battery self test is the equivalent of battery quick test.



Contrast

Change the screen contrast to make it more visible on different environmental conditions.



Beeper

Turn the beeper sound on/off.

**Language**

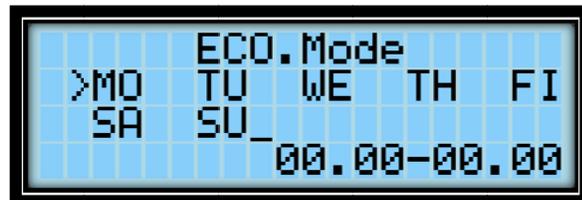
Set the menu language.

**Communication**

Set the protocol for the RS232 connection. The options are SEC, Megatech and TELNET.

**Economy Mode**

Economy mode (ECO) and UPS switch to static bypass mode at the specified days and hours. Use this menu to setup the days and hours.

**Service Menu**

Service menu is password secured, and cannot be accessed with the user password. Default password for the service menu is 7890.

**Version**

Can be accessed to inverter, rectifier, CPLD, front panel software version and UPS serial number, apparent power (KVA), instantaneous output voltage (phase-neutral), instantaneous output frequency(Hz), number of parallel battery arm x number of serial battery arm and battery capacity adjusted for UPS via version menu.



2.4.9 Logging Menu

Last 500 events of the device can be seen in the logging menu.

When viewing a log, press enter to see detailed info about the UPS. All recorded data for that particular event (status, setup etc.) can be seen on the menu.

Use up and down keys to see older/newer event logs.



3. Installation

3.1 Single Mode Installation

In this section, the warnings which must be followed and the checking which must be performed before starting-up the UPS are stated. Additionally, you can find informations about the points you must pay attention during carrying style for cabinets, positioning and connections.

Warnings



The UPS must be installed by a certified electrician.

Do not energize the UPS before proper installation.



Battery Hazard

Battery terminal voltage reaches up to 700 Vdc during operation.

Proper safety gear must be used to protect the skin and the eyes from electrical arcs.

Check the batteries for leakage before using them.

ESD-protected rubber gloves should be used.

Battery ingredients are hazardous. In case of contact with battery ingredients, rinse the skin with water, and consult a physician if irritation occurs.

Remove any metal accessories (ring, watch, etc.) before working on the device.

UPS, needs a feeding which has 3-phases and four-wire (+earth) on the input. Feed type is suitable for connection to IEC 60364-3. Optional 3-wire to 4-wire conversion transformers are available.

If it is used in IT AC power distribution systems, a 4-pole circuit breaker must be used on the input and refer to the relative IT Systems2 standart.

Detail of the subject is explained in more detail on the standart named IEC 60364-3.

3.1.1 Pre-installation check up

Before installing the device, the following checks should be carried , these are the first and most important steps in the operation of the product correctly.

- Check if any damage was done to the device during transportation. Report any damages instantly.
- Make sure that the model power rating is right. Check the device label for the actual power rating.

3.1.2 Positioning

Keep the device in a cool and dry place prior to installation.

NOTE: Unused batteries must be charged periodically.

3.1.2.1 Positioning The UPS

The UPS and the batteries are designed for indoor use, and must be placed on an area with cool air flow.

Air enters the device from the front side ventilation holes, goes out from the fans on the rear side of the device. Care must be taken in order not to cover the air entrance and exit spots.

If the area is dusty , Optional filters must be used on dusty environments.

During operation, there is a remarkable amount of heat loss to room air, so an air conditioning system must be used to keep the temperature in limits.

UPS	Amount of BTU /h for cooling	Bridge Load 100% (Non-linear) estimated BTU / h value for load working
10 KVA	3100	3700
15 KVA	4100	5000
20 KVA	5500	6600
30 KVA	7800	9400
40 KVA	9900	11900
60 KVA	14800	17800

3.1.2.2 Internal Battery Configuration

10-30 kVA UPS can be configured by 28 -50 pcs 7 Ah or 9Ah batteries according to UPS's power standard as following.

Challenger 2 Internal Battery Usage Table																				
UPS Power(KVA)	10						15						20				30			
Serial Battery Number	28		38		40		28		38		40		38		40		38		40	
Battery Group	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	2	2		
Total Number of Batteries	<u>28</u>	<u>56</u>	<u>38</u>	<u>76</u>	<u>40</u>	<u>80</u>	<u>28</u>	<u>56</u>	<u>38</u>	<u>76</u>	<u>40</u>	<u>38</u>	<u>76</u>	<u>40</u>	<u>80</u>	<u>76</u>	<u>80</u>			
I _{bat_max} @ V _{bat_cut off} . (A)	29,6		21,8		20,7		44,4		32,7		31,1		43,6		41,4		65,4		62,1	
Recommended Internal Fuse (A)	40						50						50				80			
Recommended Back-Cover Fuse (A)	40						50						50				2X40			

* These table shows the recommended battery configurations.

* Fast and semi-conductor protection type of fuse is used for batteries.

The following general battery safety precautions and warnings should be observed at all times:

Do not dispose of battery in fire

Do not attempt open the batteries.

Eye protection should be worn to prevent injury from electrical arcs.

Remove rings, watches, necklaces, bracelets and all other metal objects.

Use only tools with insulated handles.

Wear rubber gloves and a rubber apron when handling batteries.

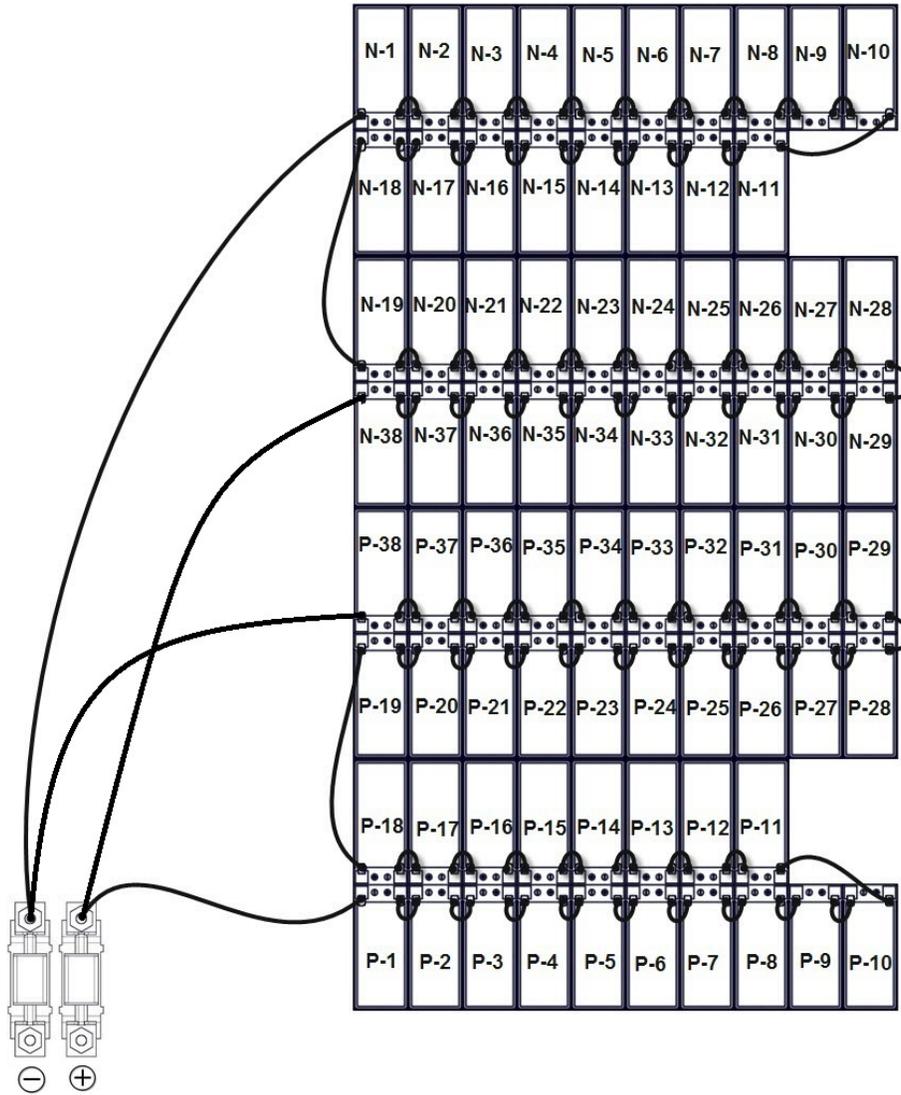
If a battery leaks electrolyte or is otherwise damaged, it should be placed in a container resistant to sulfuric acid and disposed of in accordance with local regulations.

If electrolyte comes into contact with the skin the affected area should be washed immediately with plenty of clean water.

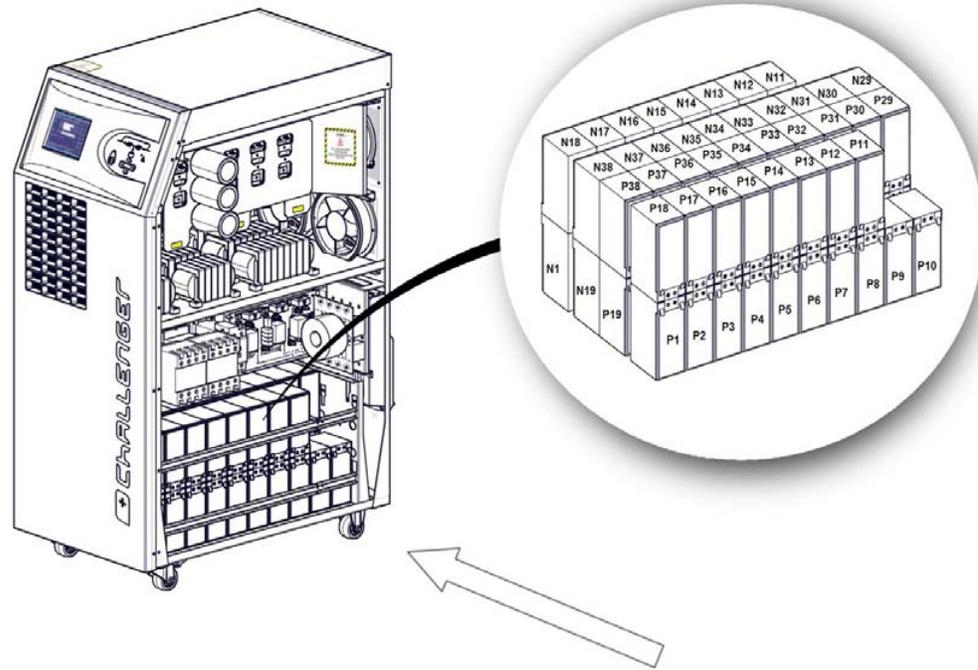
Ensure correct connections of paralel and series cables.

The batteries' positioning shapes can be seen at the following table ;

38x2 Battery Set

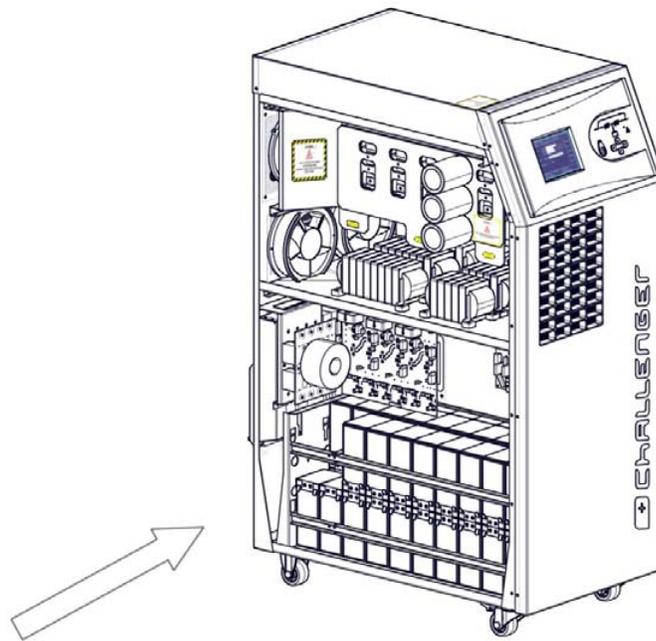


CH1060EN06R1



RIGHT-SIDE VIEW OF THE UPS

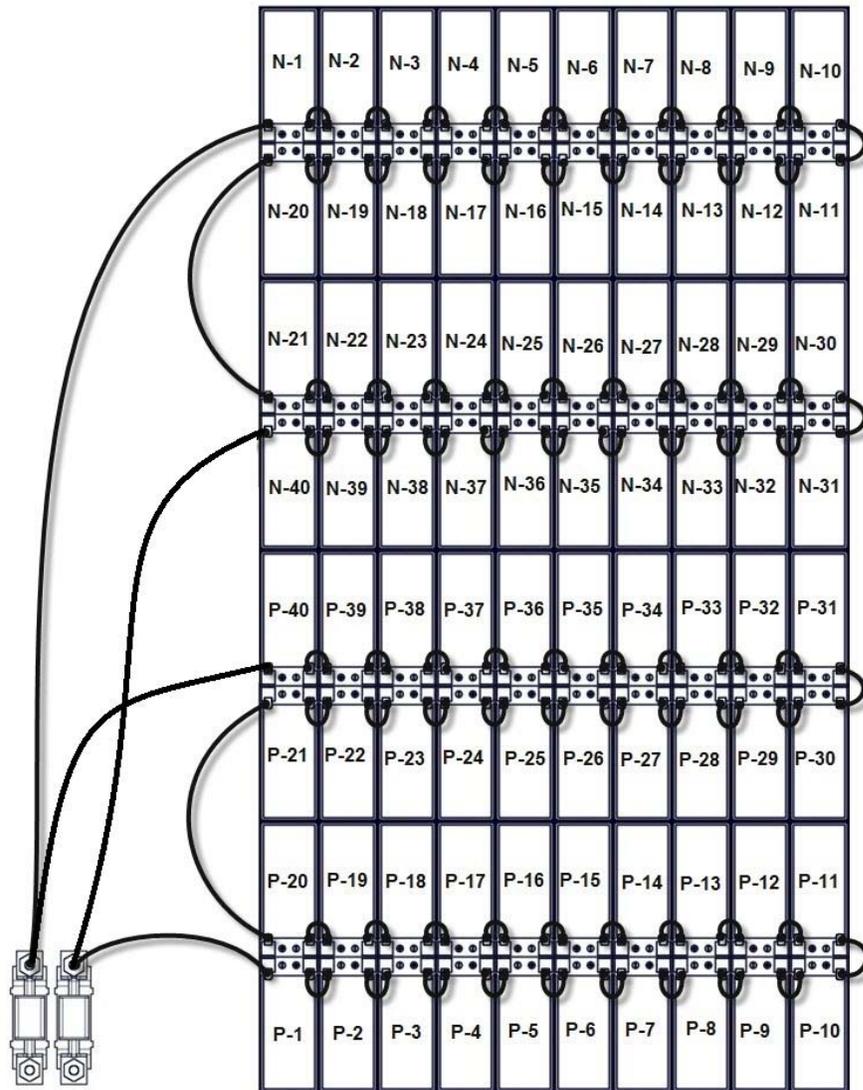
CH1060EN07R0



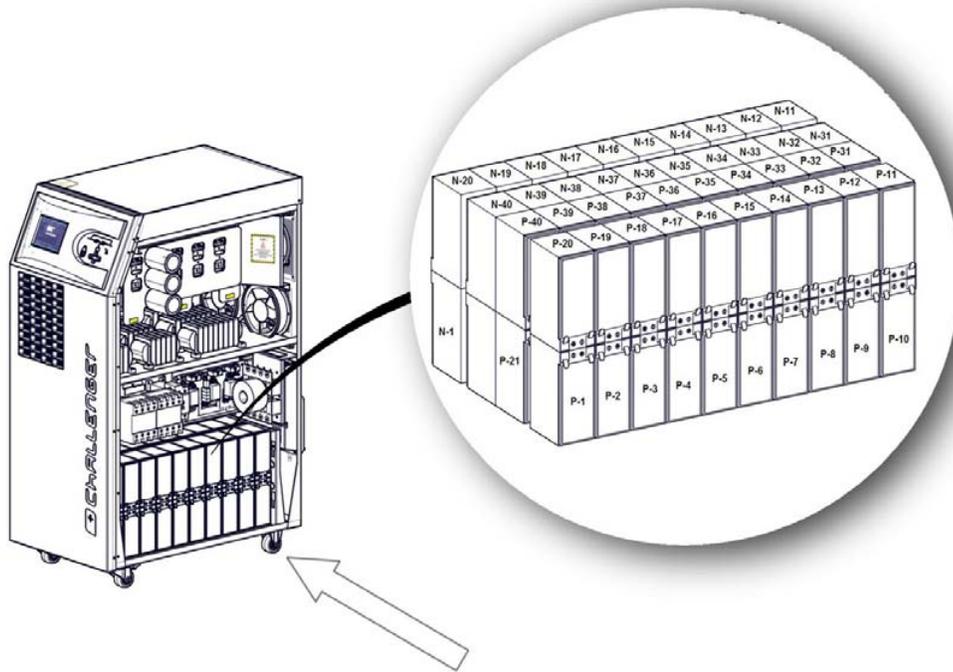
LEFT-SIDE VIEW OF THE UPS

CH1060EN08R0

40x2 Battery Set 51-54-52

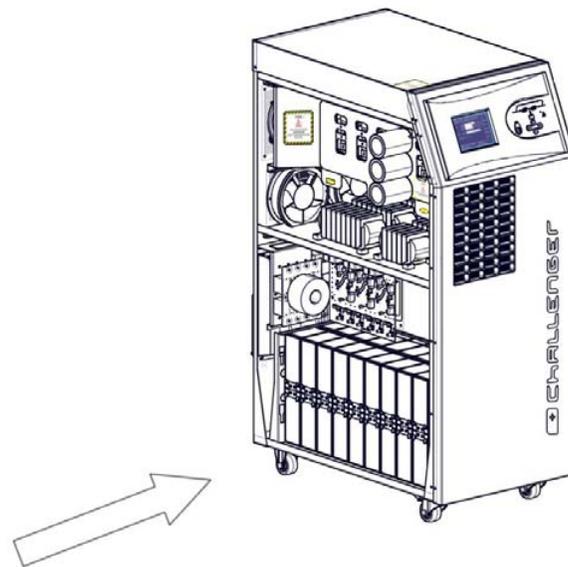


CH1060EN09R1



RIGHT-SIDE VIEW OF THE UPS

CH1060EN10R0



LEFT-SIDE VIEW OF THE UPS

CH1060EN11R0

3.1.2.3 External Battery Configuration

Batteries should be mounted in an environment where the temperature is consistent and even over the whole battery. Temperature is a major factor in determining the battery life and capacity. The recommended operating temperature for batteries by battery manufacturers is 20-25 °C . Operating above this range will reduce the battery life while operation below this range will reduce the battery capacity. Therefore ,the expected backup time will not be obtained while autonomy. As a result, keep batteries away from heat sources and main air inlets. Pay attention and observe the following points.

- Keep batteries away from main heat sources.
- Keep batteries away from main air inlets.
- Keep batteries away from the humid places. Hereby batteries can be prevented from terminal oxidations and possible leakage currents.
- Please use aR or gR semi-conductor type fuse at the battery rooms and cabinets.
- If it is possible , please use breaker switch without fuse for the battery cabinet.
- Keep battery cabinets and shelves high above the ground. UPS should be protected against floods or liquid contacts.
- Battery rooms should be properly ventilated.
- Shelves will be accessible in touch if batteries are in battery room. Therefore please keep restricted accessing to battery room. Use necessary safety writings and strips

Especially, for the external cabinet batteries system of UPS, fuses must definitely be used. These fuses must be mounted as close as possible to the batteries. This closeness will increase the electrical operation safety.

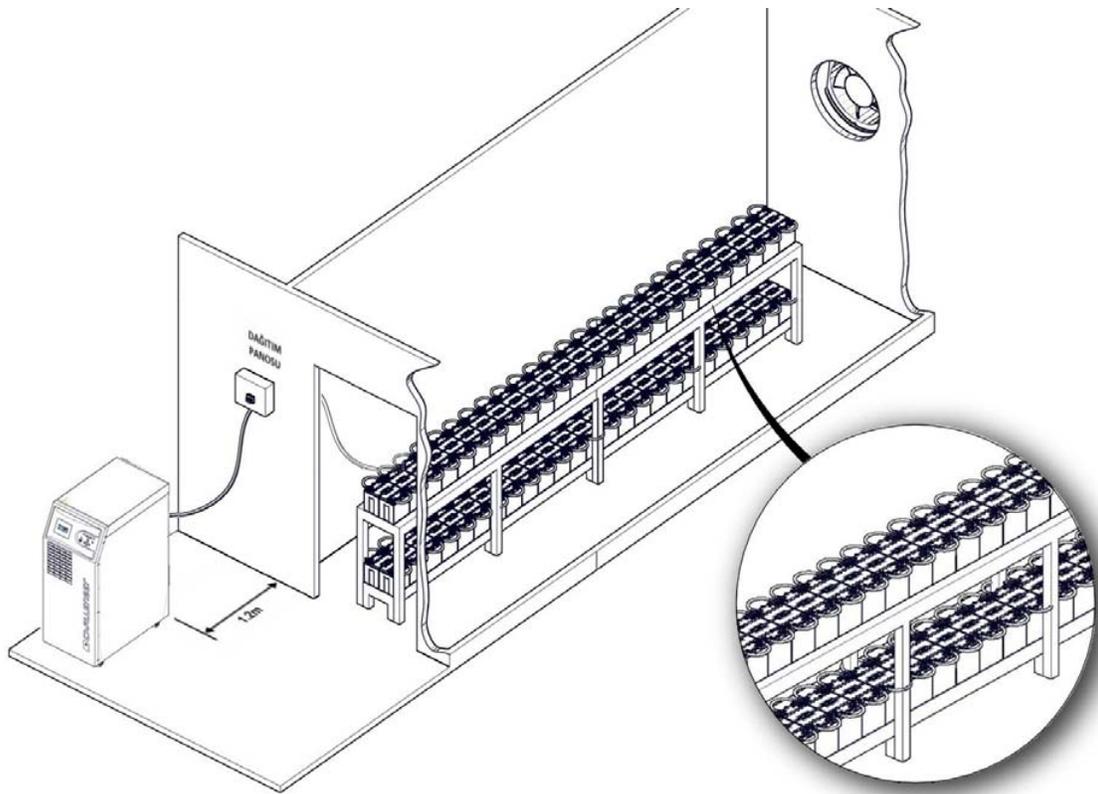
THE TABLE OF CHALLENGER SERIES EXTERNAL BATTERY CONFIGURATION							
UPS Rating (KVA)	10						
Total number of Batt.	28	32	36	38	42	46	50
I_char_max@V_bat_max(A)	5,2	4,5	4,0	3,8	3,5	3,2	2,9
I_bat_max@V_cut_off(A)	31	27	24	23	21	19	17
Recommended fuse for external cabinet (A)	40	32	32	32	25	25	20

THE TABLE OF CHALLENGER SERIES EXTERNAL BATTERY CONFIGURATION							
UPS Rating (KVA)	15						
Total number of Batt.	28	32	36	38	42	46	50
I_char_max@V_bat_max(A)	7,8	6,8	6,0	5,7	5,2	4,7	4,3
I_bat_max@V_cut_off(A)	46	40	36	34	31	28	26
Recommended fuse for external cabinet (A)	63	50	40	40	40	32	32

THE TABLE OF CHALLENGER SERIES EXTERNAL BATTERY CONFIGURATION								
UPS Rating (KVA)	20				30			
Total number of Batt.	38	42	46	50	38	42	46	50
I _{char_max@V_{bat_max}} (A)	7,6	6,9	6,3	5,8	11,4	10,4	9,5	8,7
I _{bat_max@V_{cut_off}} (A)	45	41	37	34	67	61	56	51
Recommended fuse for external cabinet (A)	50	50	50	40	80	80	63	63

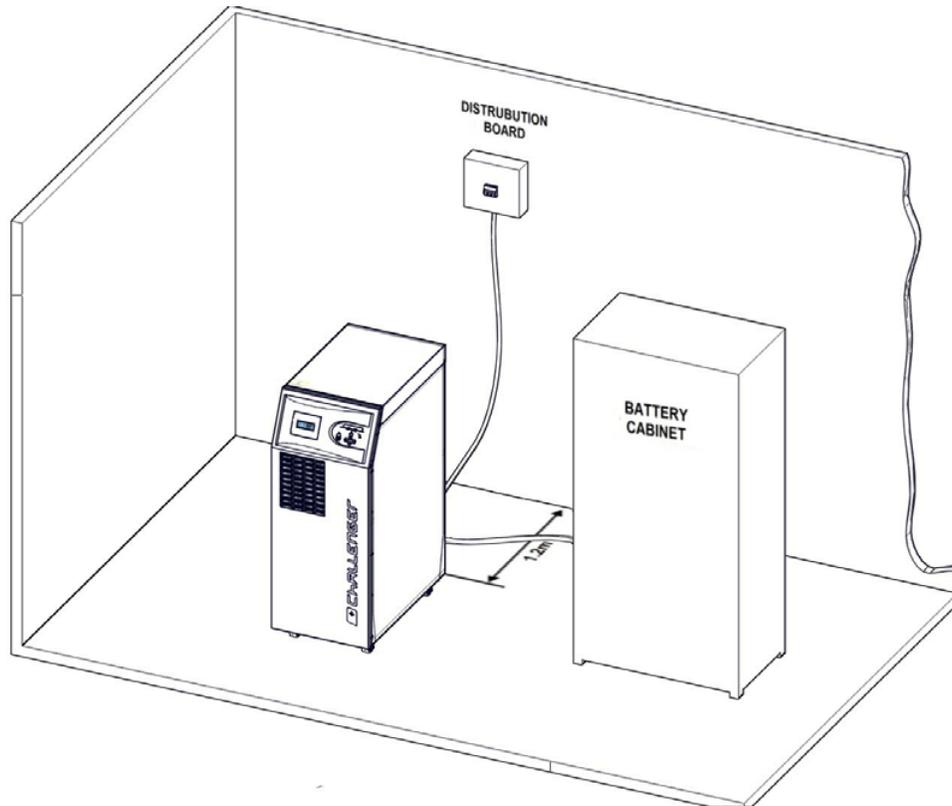
UPS Rating (KVA)	40		60
Total number of Batt.	48	50	50
I _{char_max@V_{bat_max}} (A)	12,1	11,6	17,4
I _{bat_max@V_{cut_off}} (A)	71	68	102
Recommended fuse for external cabinet (A)	80	80	125

External battery cabinet and battery room applications are given below as an example. The application form may vary according to the customer.



CH1060EN12R0

Example Battery Chamber Application



CH1060EN13R0

External Battery Cabinet Application

3.1.3 Transportation Type of Cabinets

Carrying vehicles or handling accessories must have enough features and characteristics to carry UPS's weight.

Cabinet is equipped with four-wheel. Thanks to this feature, it can be moved easily. These wheels must be used only on smooth surfaces.

The front side wheels of UPS must be locked after positioning properly. The back side wheels are fixed. Be more careful of sudden movements, especially when batteries are inside of cabinet.

Move the UPS as rarely as possible.

3.1.4 Main, Load and Battery Connections

MAKELSAN strictly recommends a distribution board for the UPS outputs. Proper fuses and breakers must be used in such distribution board. A-B type fuses or magnetic breakers are recommended if the load is suitable.

3.1.4.1 External Protection

To protect the AC inputs, thermal magnetic breakers or V type breakers must be installed on the distribution board.

Over current protecting must be installed on mains input distribution board and fuses must be chosen 135% higher rated than the ones given in the table below. Fuses must be C-type.

Ground leakages flow to the ground through the EMI filters on the input and the output of the UPS. MAKELSAN recommends the use of 700mA rated relays for handling leakage currents.

Those relays must also be:

- ✓ Resistant to both positive and negative DC pulses,
- ✓ And not sensitive to transient currents.
- ✓ Must be sensitive to currents which is average between 0,3-1 A.

3.1.4.2 Cabling and fuse configuration

Full load input and output currents must be reviewed for proper cabling and fuse selection.

UPS Rating (KVA)	Rated Currents (A)					
	Input currents@max charge current (3P+N)			Output Currents @100% Load (3P+N)		
	380V	400V	415V	380V	400V	415V
10	17,1	16,2	15,7	15,4	14,6	14,1
15	25,6	24,4	23,5	23,1	21,9	21,1
20	34,2	32,5	31,3	30,8	29,2	28,2
30	51,3	48,7	47	46,2	43,9	42,3
40	68,4	65	62,6	61,6	58,5	56,4
60	102	97	94	93	88	85

It should be noted that with non-linear loads, neutral current may rise upto 1.5 times the phase current.

Ground cable must be connected directly to ground line and must be kept as short as possible. Typical ground cable cross sections are 2.5mm²for 10 kVA, için 6mm²for 15 kVA, 10mm² for 20 kVA, 16mm²for 30 kVA and 25mm²for 60 kVA ratings.

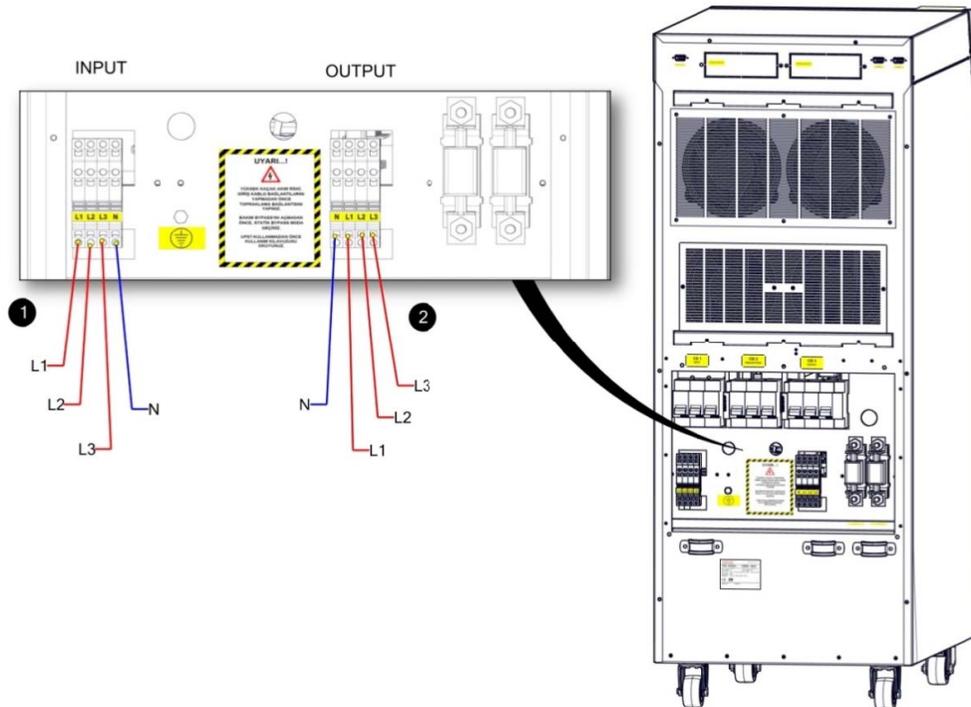
3.1.4.3 Cable connections

All electrical connections of the UPS are made from the rear side of the device. Remove the metal cover to reach the input and output connections.



ATTENTION ! 3 pole-circuit breakers (switch) are used for the input and output of UPS,

Neutral line is not be interrupted.

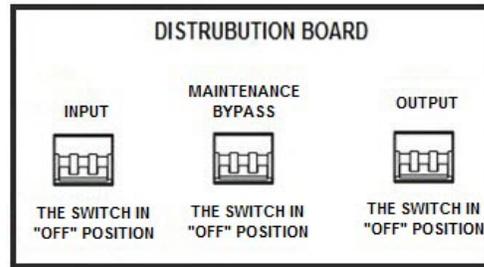


CH1060EN14R0

1	Input Terminals
2	Output Terminals

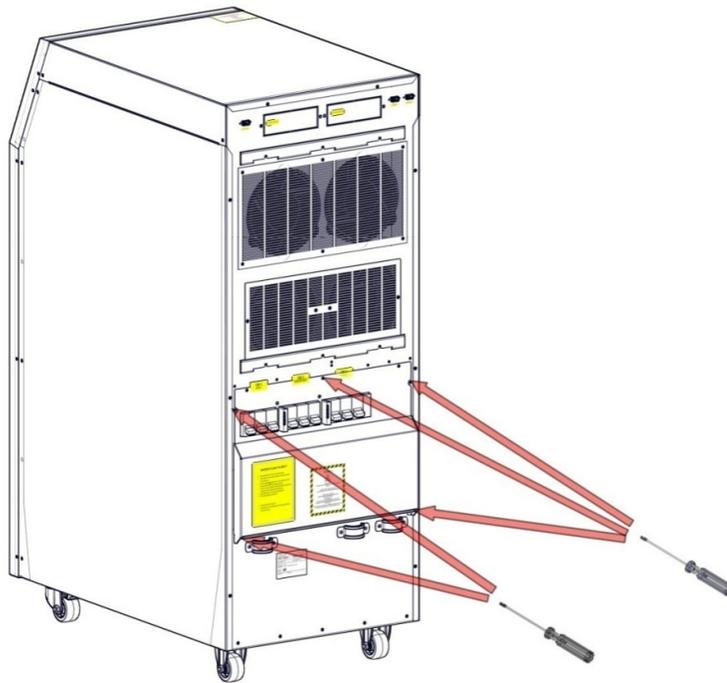
Follow the steps below to electrical connections:

1. Make sure that the network and loads are isolated through cables by turning off the all breakers on the distribution board.



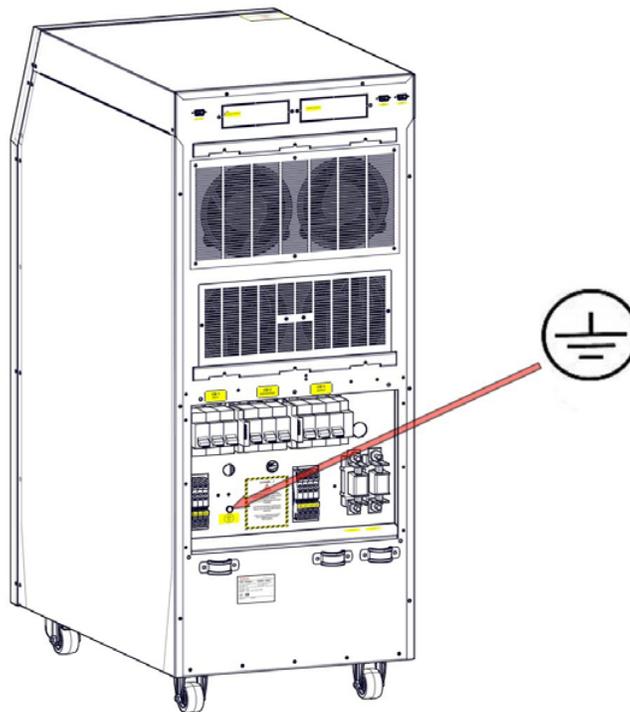
CH1060EN15R0

1. Unscrew and remove the metal board on the rear side of the device.



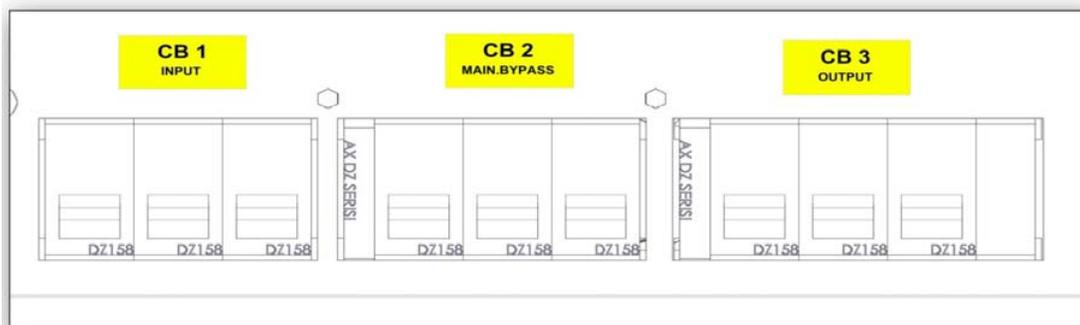
CH1060EN16R0

2. Connect the ground cable.



CH1060EN17R0

3. Make sure that the circuit breakers are off. The use of these circuit breakers are explained on the operation section.

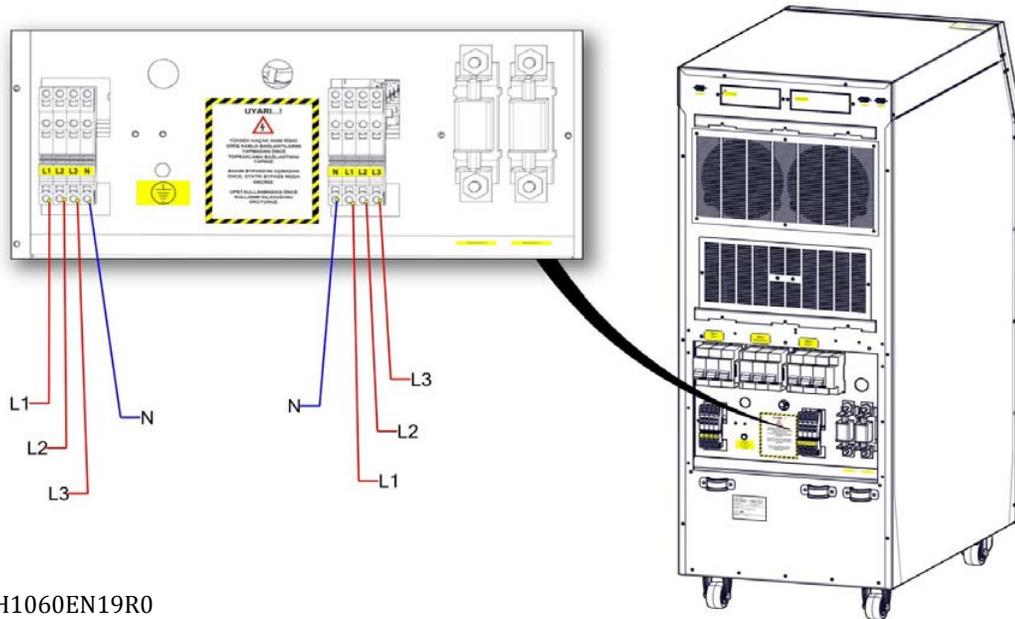


The switch is turned to the " OFF " position

The switch is turned to the " OFF " position

The switch is turned to the " OFF " position

4. Connect the input cables.
 - R to INPUT L1,
 - S to INPUT L2,
 - T to INPUT L3,
 - N(Neutral) to INPUT N.



CH1060EN19R0

6. Check the phase sequence.
7. Repeat steps 5-6 for output cables.
8. Replace the rear board and tighten the screws

Use the cable clips to stabilize the cables when the connections are done.

WARNING: Make sure that the loads are isolated from the UPS output if they are not ready to be connected.

WARNING: Make sure that the cables are connected properly before UPS is started. Additionally, check if there is galvanic isolation transformers at input of UPS and consider the local directions.

WARNING: Check the grounding before starting the UPS. Wrong works or grounding on UPS or other devices of installation may be hazardous. Wrong works and grounding may damage UPS and another system on the installation.

3.1.4.4 Battery connections

You can find explanations about installation procedures and connections of internal and external batteries in this section.



Battery Hazard

- The battery terminal voltage can reach up to 700 Vdc.
- Preserve your eyes and skin against possible arcs.
- Check for leaks before connecting the batteries.
- Batteries have harmful content. In case of contact wash with plenty of water. If irritation persists, consult a doctor.

Remove the metal accessories such as ring ,watch before working with batteries

3.1.4.4.1 Internal Battery Installation Procedure and Connection

Battery installation procedure

Read the following steps to connect the internal batteries properly.

1. Remove the battery fuse.
2. Make sure that the batteries are connected properly in series and parallel.
3. Reach the -BAT labeled cable inside the UPS and connect it to the negative battery terminal.
4. Reach the +BAT labeled cable inside the UPS and connect it to the positive battery terminal.
5. Check the polarity of the battery connection once again.



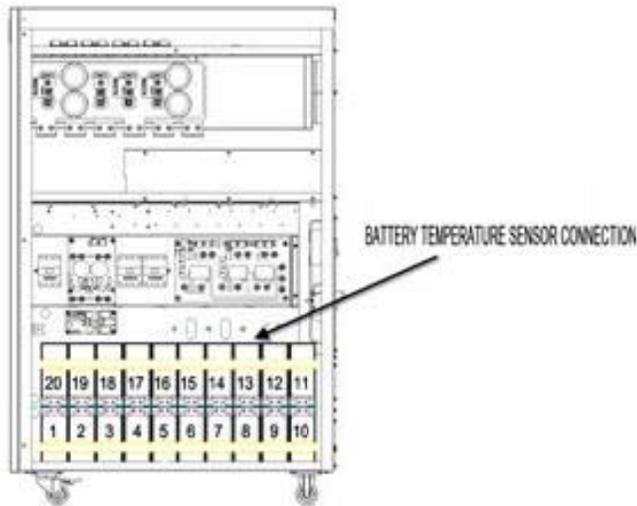
Avoid short circuiting batteries .Exploding batteries can damage you and your environment!

Battery terminal may rise up to 450 Vdc.

6. Replace the metal rear cover.

Battery monitoring

Internal battery temperature is monitored by the NTC connected to the J26 socket of the mainboard.



CH1060EN20R0

Refer to the options section for external battery monitoring.

3.1.4.4.2. External Battery Installation Procedure and Connection

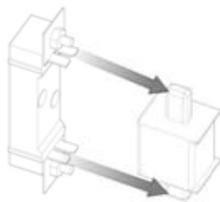
You can see detailed information about how to be positioned of external batteries under the title of external batteries positioning above. In this section, Information about connecting batteries to UPS was given



Avoid short circuiting batteries .Exploding batteries can damage you and your environment!

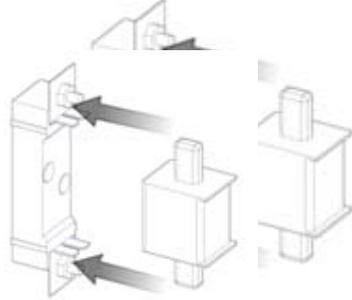
Battery terminal may rise up to 700 Vdc

1. If any switch breaker exist on the battery cabinet, switch Off them.
2. Remove the battery fuse in the battery cabinet.
3. Remove the battery fuse on the UPS.



CH1060EN21R0

4. Make sure that the batteries are connected properly in series and parallel.
5. Connect the negative battery terminal to -BAT cable, also connect the positive battery terminal to the +BAT cable in the UPS.
6. Check the polarity of the battery connection once again.
7. Replace the battery fuse on the UPS.



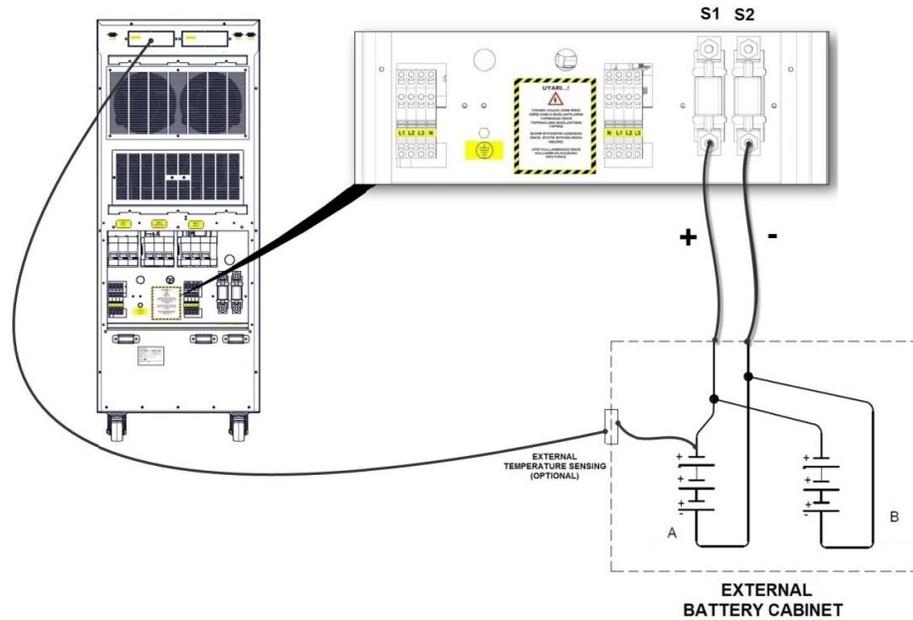
CH1060EN22R0

8. Replace the battery fuse in the battery cabinet.
9. If any switch breaker exist on the battery cabinet, switch ON them.
10. Please check that whether there is appropriate battery voltage on the input terminals of the battery of UPS by measurement tool.

The external battery cable selection is determined by the application. Recommended fuses are given for UPS and battery cabinet. The lowest diameter cable that can be connected to those fuses is recommended to be used. Please, refer to standard called EN 50525-2-31(VDE 0100-430) in this subject. Bu konuda EN 50525-2-31(VDE 0100-430) adlı standardı referans alınız. selection should be such that the cable will allow at most 0.5 Vdc decreasing.

“External Battery Temperature Measurement Kit” which is sold as optional is recommended to purchase for optimization according to battery temperatures on the external battery cabinets applications. Otherwise, your batteries will not be optimized according to temperatures.

The external battery connection diagram is given below.



CH1060EN23R0

3.1.4.5 Control and Communication Cable Connections

MAKELSAN UPS have standart or optional connections of advanced external battery cabinet, environmental monitoring, control panels and various intelligent monitoring.

Connections on the rear side of UPS :

- One RS232 serial communication connector (RS232/Rectifier Service)
- One RS232 serial communication connector (RS232/Inverter Service)
- Two optional card slot
- One paralleling connection connector

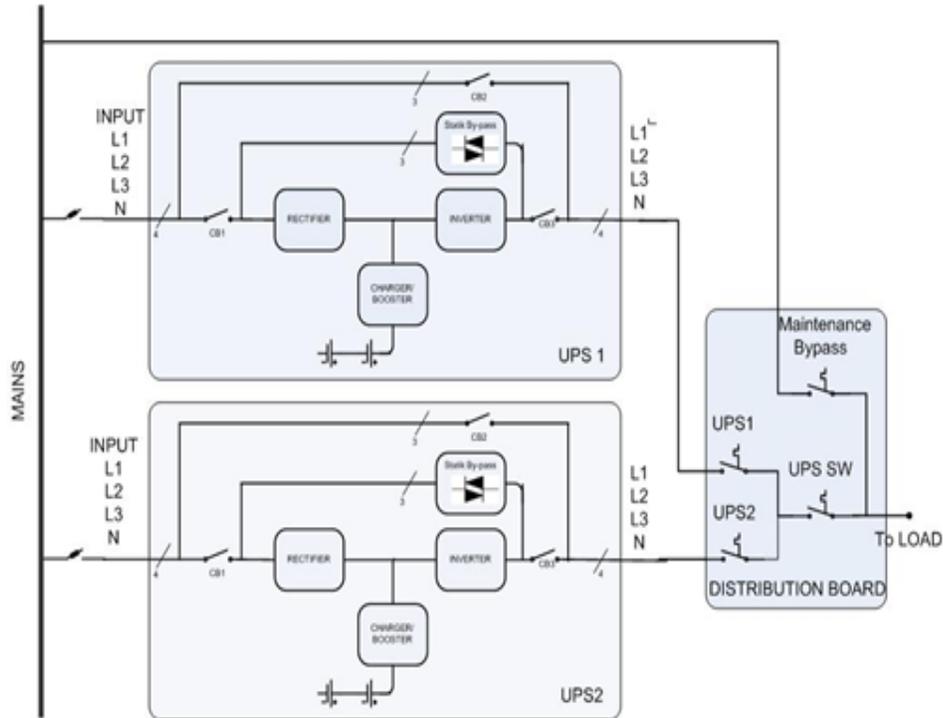
3.2 Parallel Installation

The product which you have bought can be operated in parallel; however, this feature is offered as an option. Please contact your dealer for parallel operation.



Parallel application should be made by authorized personal of MAKELSAN !

In case of need for redundancy or more power, Challenger series UPS can be operated in parallel up to quantity 8 (eight). A schematic diagram which shows two UPS connected in parallel can be seen below.

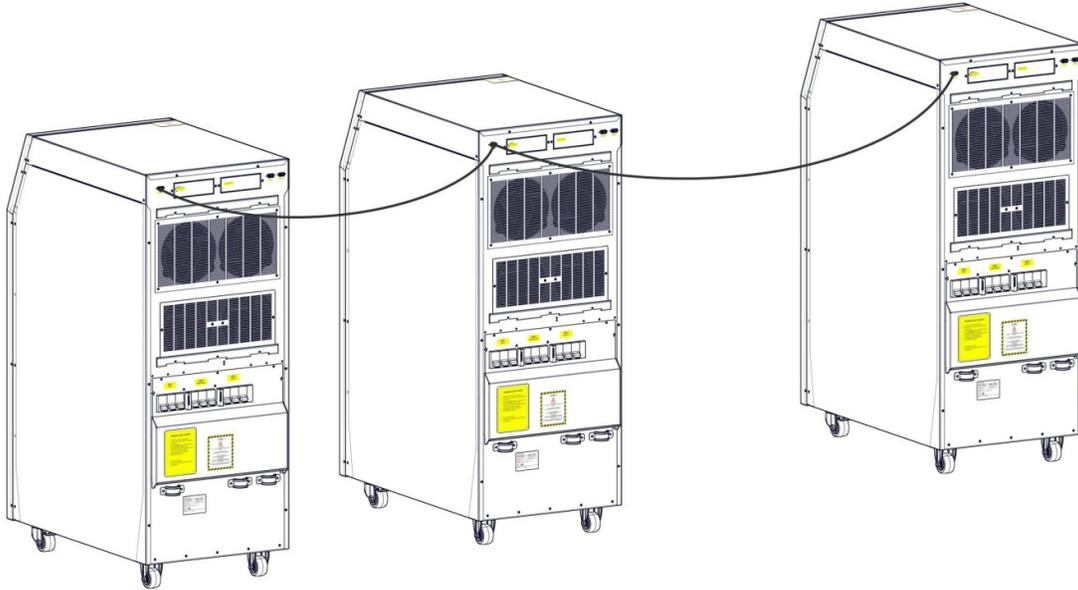


Inputs and outputs of more than one UPS are connected to each other; but definitely each battery group is different from another, batteries can not be used in common. The following points should be considered while placement of UPS in parallel system and their electrical connections are made:

- ✓ UPSs connected in parallel must have the same power rating and must be the same series.
- ✓ Devices must be running on the same firmware, if not, old firmwares must be updated.
- ✓ Devices must be located as close as possible to each other (max. 6 x 110 cm paralleling cables.)
- ✓ Each device must have its own neutral cable .
- ✓ Each device must have its own ground connection.
- ✓ UPS must be connected in paralel on the distribution panel and phases must be connected correctly. $(U_1-U_2-...-U_N)$, $(V_1-V_2-...-V_N)$, $(W_1-W_2-...-W_N)$.
- ✓ Each UPS must have their own battery set, batteries cannot be used for more than one device at the same time.
- ✓ The length of all cables which are connected to distribution panel must be the same for the equal current sharing.

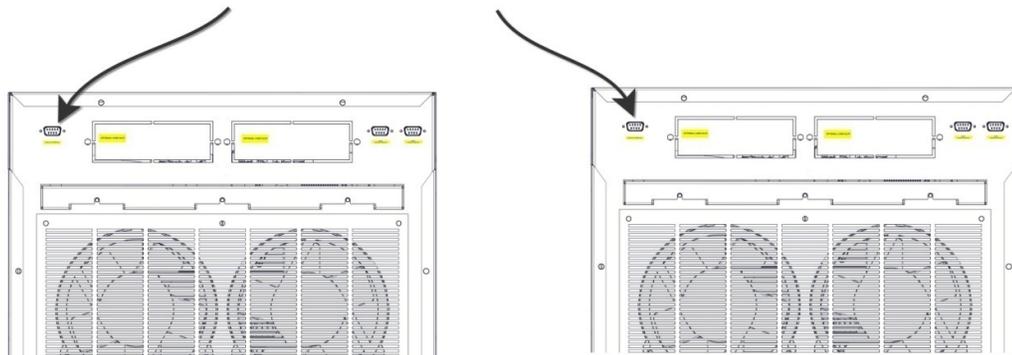
Parallel Settings

Connect the parallel cable as shown in figure below. Only use the cables provided by MAKELSAN.



CH1060EN24R0

PARALLEL CONNECTION SOCKET



CH1060EN25R0

* Software settings on the user panel should be made by authorized personnel.

4. Operation

4.1 Operation Procedure

Bu bölümde devre kesiciler, ilk çalıştırma, KKG'nın çalışma tiplerinin testleri, KKG'nın kapatılması, EPO ve RS232 seri haberleşme sistemi hakkında bilgi bulabilirsiniz.

4.1.1 Circuit Breakers

These are used for the AC input, maintenance bypass, output and the battery connections respectively.

Three-phase AC voltage is applied through **CB1** to input of UPS.

AC input voltage will be applied directly to loads through **CB2**. In this way, maintenance purposed switching is done properly. If UPS is actived while it is working thanks to auxilary short circuit info located in CB3, mains makes the bypass static switches actived. The system will be switched to maintenance mode smoothly.

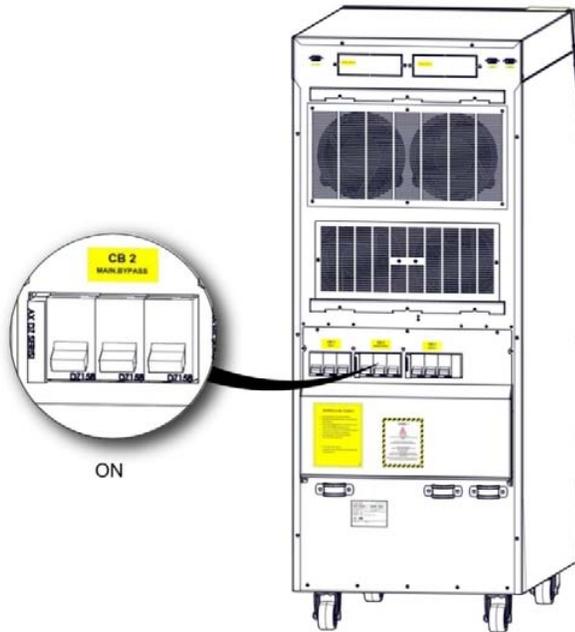
CB3 is used to connect or seperate AC voltage that come from static switches to the loads on UPS.

Active Brakers	Operation Mode	Explanation
CB1, CB3, CB4	Normal Mode	UPS operates in normal mode.
CB1, CB3, CB4	Static Bypass Mode	UPS is overloaded, loads will be transferred to static bypass line temporarily.
CB2	Test Mode	UPS is ON, but loads will be fed through mechanical bypass line.
CB2	Maintenance Mode	UPS is shut down for maintainence, loads will be fed through mechanical bypass line.

4.1.2 First Start-Up

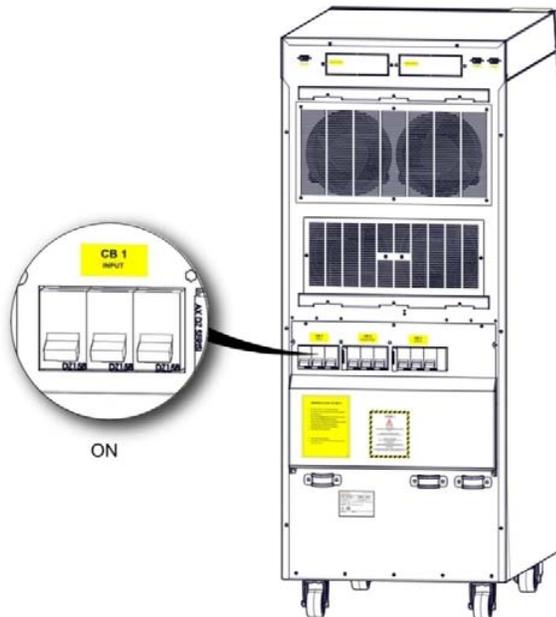
WARNING: Wait for at least 5 seconds between each step.

1. Turn the Maintenance (CB2) bypass breaker "ON"



CH10

2. Turn the input (CB1) breaker "ON"

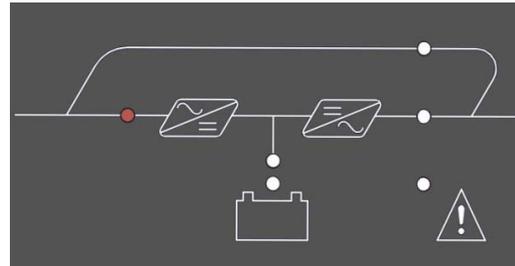


CH10

3. Start the UPS using the front panel.
 "Main menu> Control > Password > Start"

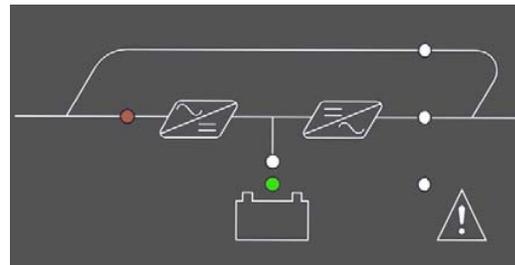


4. Wait for the operation of the rectifier. Rectifier LED on the mimic diagram will flash for a while, and then remain lit.



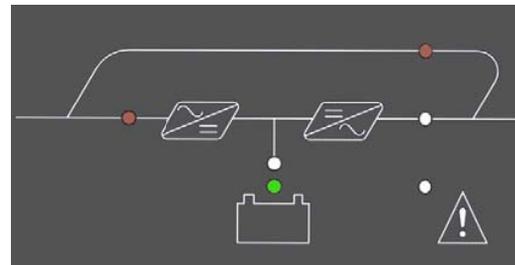
CH1060TR28R0

5. Wait for the operation of the battery charge. Battery charge LED on the mimic diagram will be lit continuously.



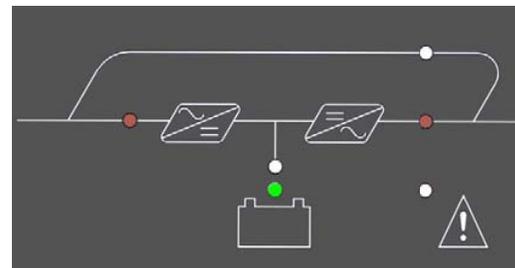
CH1060TR29R0

6. Wait for the switching of UPS to static bypass mode. Static bypass LED on the mimic diagram will light up.



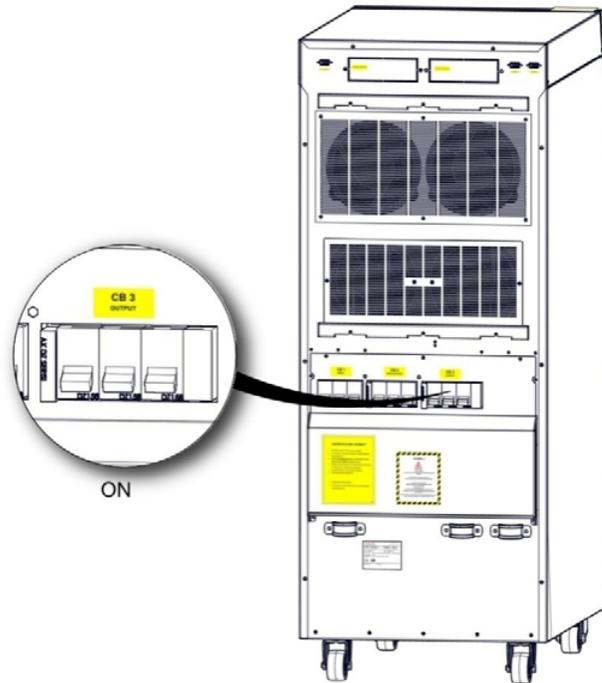
CH1060TR30R0

7. Check the UPS has switched to normal operation mode, via mimic diagram LEDs and LCD panel.



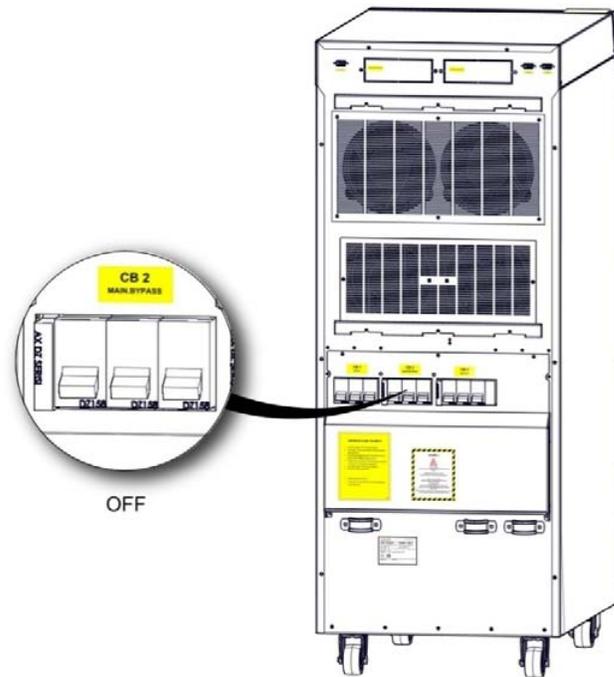
CH1060TR31R0

8. Verify that batteries are switched via front panel indicator and "Status > Battery" menu.
9. Turn output circuit breaker (CB3) ON.



CH1060EN32R0

10. Turn the maintenance bypass breaker (CB2) OFF.



11. The loads which are connected to UPS can be turned on.

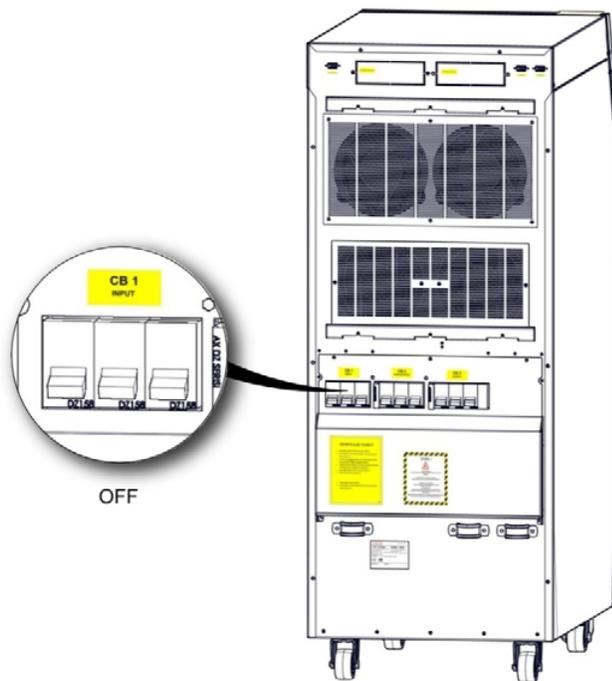
After all these steps, check that load is fed through inverter static switches via mimic diagram. In a contrary situation, check UPS total and phase loads. The UPS gives audio alerts in an overload condition, without feeding critical AC loads.

4.1.3 Testing of Types of UPS Operation

After first start-up check device operation by switching between the following modes manually.

4.1.3.1. Switching from Online Mode to Battery Mode

Turn CB1 OFF. This action cuts off the mains voltage and the UPS starts operating on battery mode. Turn CB1 back ON again if everything is ok.

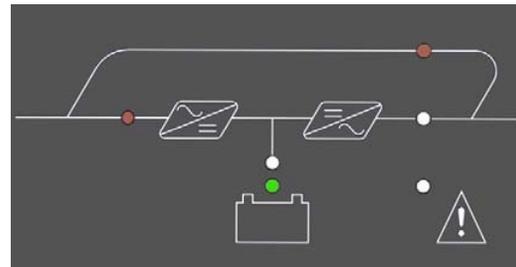


CH1060EN34R0

4.1.3.2 Switching from Online Mode to Static Bypass Mode

Use the front panel to switch the device to static bypass mode. Check the mimic panel to make sure that the device has switched to bypass mode.

Main menu > Control > Switch to Bypass



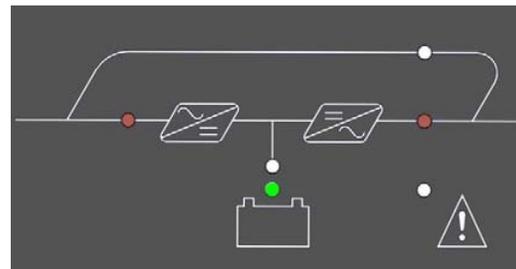
CH1060TR35R0

NOTE: UPS will not switch to bypass mode if the inverter voltage is out of limits or there is an overload or overtemperature situation.

4.1.3.3 Switching from Static Bypass Mode to Online

Use the front panel to switch the device to online mode. Check the mimic panel to make sure that the device has switched to online mode.

Main menu > Control > Switch to UPS



CH1060TR36R0

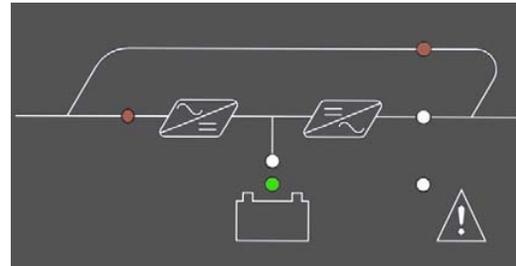
NOTE: The UPS will not switch to normal mode if the inverter voltage is out of limits, or there is an overload or overtemperature situation.

4.1.3.4 Switching from Online Mode to Maintenance Bypass Mode

WARNING: Make sure that the inverter output is synchronous with the maintenance bypass line before switching to maintenance bypass mode. Otherwise there is a possibility of cutting off the load power for a short while.

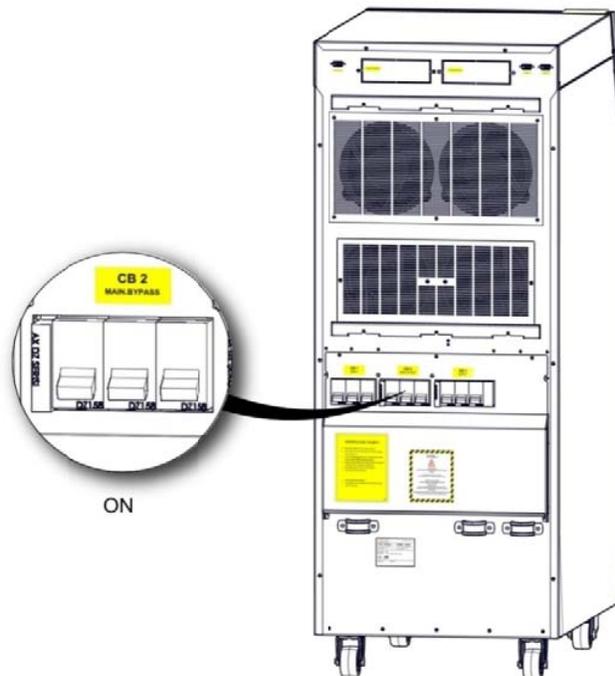
Use the front panel to switch the device to static bypass mode. Check the mimic panel to make sure that the device has switched to bypass mode.

Main Menu > Control > Output BYPASS



CH1060TR37R0

1. Turn CB2 ON.



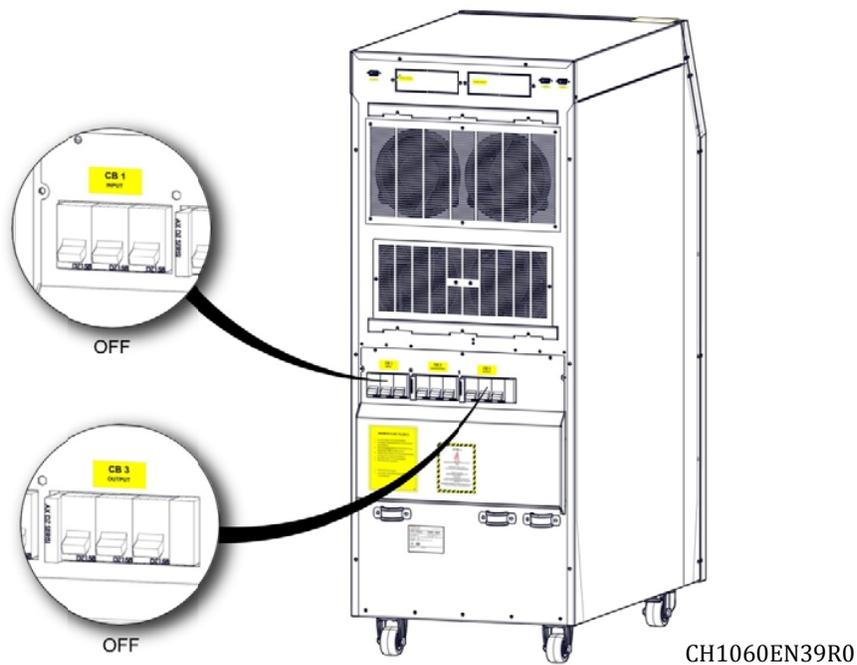
CH1060EN38R0

2. Stop the UPS by using front panel.

Main menu > Control > Stop



3. Turn CB1, CB3 and CB4 OFF.



WARNING:



Wait at least 5 minutes before opening up the device after it is completely turned off, for safety

4.1.4 Performing a Complete Shut Down

1. Turn off the loads connected to the device.
2. Use the front panel to turn the device OFF by following, "**Main Menu> Control> Password> Stop**".



WARNING :

Make sure that there are no critical loads on the UPS output before performing a complete shutdown.

4.1.5 EPO (Emergency Power Off)

UPS turns off rectifier, amplifier and inverter respectively when the EPO button is pressed. UPS is completely separated from the system, if the shutdown option of output circuit breaker is setted.



CH1060EN40R0

4.1.6 RS232 Serial Communication Installation and Investigation

Challenger series has an RS-232 interface which supports SEC and TELNET protocol as standart.This interface is fully isolated and safe. UPS can be monitored remotely via a computer (PC) or SNMP by using this protocol. This connection works with all kinds of options.

5. Explanations of Logging

UPS will beep when any problem is detected. You can see the first information about the situation on the front monitor panel. This may not be enough most of the time. In this case, you can see the following warnings by using log screen.

	Warning	Warning Description
1	RS232 Start Command	UPS was started by RS232 communication software.
2	RS232 Stop Command	UPS was stopped by RS232 communication software.
3	Auto Restart	After the batteries discharge totally, UPS restarted itself automatically after the mean time which adjusted that
4	UPS Startup	The main board of the UPS is energized.
5	Soft Start Fail	UPS could not ramp the DC bus up.
6	Quick Battery Test	Quick battery test has began.
7	Deep Battery Test	Battery capacity test has began.
8	Battery Self Test	Periodical battery test has began.
9	End Of Discharge	Batteries' voltage has gone below cut off voltage value while UPS was operating on the battery mode.
10	Overload Timeout	UPS has operated at overload more than time limit adjusted. The Loads will be transferred to bypass line.
11	End of Battery Test	Battery test has completed. You can see the all results via front panel status menu.
12	Batt. Test Aborted	Test was aborted manually or by UPS since the criterias were not provided during battery test.
13	Manuel Switch To BYP	Static switches directions were changed manually to the bypass line via UPS command menu.
14	No Battery	No battery detected.

15	Maint. BYP. Sw. On	Maintenance bypass switch has been activated.
16	Ambient Abnor. Temp.	The ambient temperature is over limit. Check the ventilation of UPS room.
17	Battery over-current	UPS battery charge current is out of the specified limits. Charge will be OFF until return to normal operating.
18	Mains Voltage bad	Mains voltage is out of the specified limits, UPS will switched to battery mode.
19	Inverter Overtemp.	Inverters temperature is out of limit, in case of 5 degrees more increment, Load will be transferred to Bypass line.
20	PFC Overtemp.	Rectifier 's temperature is out of limit, in case of 5 degrees more increment ,Load will be transferred to Bypass line.
21	Chrg OverTemp.	Charge / boost module temperature is out of the specified limits. If it is in charge mode, Charge will be stopped. If it is in boost mode, UPS will be stopped.
22	STS Overtemp.	Static Transfer Switches' temperatures are out of limits. UPS will be stopped.
23	Outp.PL1 Cur. Limit.	Short circuit protection is activated for output L1 phase.
24	Outp.PL2 Cur. Limit.	Short circuit protection is activated for output L2 phase.
25	Outp.PL3 Cur. Limit.	Short circuit protection is activated for output L3 phase.
26	Bypass Voltage Bad	Bypass voltage value is out of limit while UPS was operating on the bypass mode. UPS will switch to normal mode if temperature and load status are normal.If not ,UPS will stop.
27	Bypass Freq. Bad	Bypass frequency value is out of limit while UPS was operating on the bypass mode. UPS will switch to normal mode if temperature and load status are normal.If not ,UPS
28	Coil Overtemp	Over temperature is observed for UPS' inverter and rectifier coils.
29	Inverter Voltage Bad	Inverter voltage is out of limit. Load will be transferred to bypass line, when inverter voltage gets back to normal values,UPS will switch to normal mode again.

30	Overload	Output load value is over %105, overloading counter will start to count, If UPS is on normal mode, the charging will be stopped until load value gets back to normal.
31	Maint. BYP. Sw. Off	Maintenance bypass switch is deactivated.
32	Ambient Nor. Temp.	UPS ambient temperature has got back to allowed limit values.
33	Mains Voltage Nor.	Mains voltage is in the limited values, UPS will switch to normal mode.
34	Inverter Nor. Temp.	Inverter temperature is in the limited values. If load and temperature values are normal, UPS will switch to normal
35	PFC Nor. Temp.	Rectifier temperature is in the limited values. If load and temperature values are normal, UPS will switch to normal
36	Charger Nor. Temp.	Charger/booster module temperature is in the allowed limits, charging will be activated again.
37	STS Nor. Temp.	Temperature of Static transfer switches is in the allowed limit.
38	Bypass Voltage Nor.	Bypass voltage is within defined limits.
39	Bypass Freq. Nor.	Bypass frequency is within defined limits.
40	Coil Normal temp.	UPS inverter or rectifier coil temperature has got back to normal values.
41	Inverter Volt. Norm.	Inverter voltage is in the limited values, UPS will switch to normal mode.
42	Normal Load	Output load is under %100, If charging was OFF, It will be ON .
43	BYP Thyr.L1 Short C.	UPS has detected short circuit at bypass L1 thyristor. UPS will shut down.
44	BYP Thyr.L2 Short C.	UPS has detected short circuit at bypass L2 thyristor. UPS will shut down.
45	BYP Thyr.L3 Short C	UPS has detected short circuit at bypass L3 thyristor. UPS will shut down.
46	UPS Thyr.L1 Short C.	UPS has detected short circuit at inverter L1 thyristor. UPS will shut down.

47	UPS Thyr.L2 Short C.	UPS has detected short circuit at inverter L2 thyristor. UPS will shut down.
48	UPS Thyr.L3 Short C.	UPS has detected short circuit at inverter L3 thyristor. UPS will shut down.
49	UPS Thyr.L1 Open C.	UPS has detected that inverter L1 thyristor can not be activated. Load will be transferred to bypass line.
50	UPS Thyr.L2 Open C.	UPS has detected that inverter L2 thyristor can not be activated. Load will be transferred to bypass line.
51	UPS Thyr.L3 Open C.	UPS has detected that inverter L3 thyristor can not be activated. Load will be transferred to bypass line.
52	BYP Thyr.L1 Open C.	UPS has detected that bypass L1 thyristor can not be activated. Load will be transferred to inverter line.
53	BYP Thyr.L2 Open C.	UPS has detected that bypass L2 thyristor can not be activated. Load will be transferred to inverter line.
54	BYP Thyr.L3 Open C.	UPS has detected that bypass L3 thyristor can not be activated. Load will be transferred to inverter line.
55	Parl. Phs. Rot. Err.	One or more of UPSs which operate in paralel mode do not match in phase sequence.
56	Battery Start	Starting through battery command has been given to UPS.
57	Parl. Start Error	One or more of UPSs which operate in paralel mode could not start to operate.
58	Inverter Fault	UPS couldn't prepare the inverter voltage.
59	Output Off	Static transfer switches all disabled. The loads can not be energized.
60	Normal Mode	UPS is operating in the normal mode, load are energized through rectifier – inverter line.
61	Battery Mode	UPS is operating in the battery mode, load are energized through battery – inverter line.
62	Bypass Mode	UPS is operating in the bypass mode, load are energized through bypass line.
63	Maintenance Bypass Mode	UPS is operating in the bypass mode, load are energized through bypass line.

64	Parallel Mode	2 or more UPS are operating in power sharing mode. Load is fed through UPSs' inverter lines.
65	Test Mode	UPS has switched to battery test mode, loads are energized through rectifier- battery- inverter line as source sharing.
66	EKO Mod	KGK eko moddan çalışıyor. Yükler bypass hattı üzerinden besleniyor.
67	Switch to Inverter Command	The direction of the static switches was varied manually on the rectifier through UPS commands menu.
68	Output Voltage Error	Output voltage is detected during the period of starting UPS . UPS has been stopped.
69	PFC Stop Cmd.	Abnormal situation is detected during the moment of rectifier operating. UPS has stopped itself.
70	Manuel Start Command	Start command is given via UPS command menu.
71	Manuel Stop Command	Stop command is given via UPS command menu.
72	Batt. Swtch. Failure	An error occurred while ramping up the battery bus, Batteries could not be activated.
73	UPS Stopped	UPS has been stopped.
74	Bypass Problem	UPS has switched to bypass mode so many times in a short period, UPS will be shut down.
75	Parameters Changed	Device-related parameters were changed on the service menu
76	Batterys Changed	Battery replacement date has been changed. Battery statistics will be reset.
77	Battery Contactor OFF	Battery mechanical switch on the service menu was deactivated. Batteries are not active.
78	Battery Contactor ON	Battery mechanical switch on the service menu was activated. Batteries are active.
79	Battery Err.	Although connected to the UPS, batteries can not be charged.
80	Parallel Command	UPS which is operating in paralel mode has been given a command to change the status of static switches.

81	No P.CAN Bus Comm.	Slave UPS which is operating in paralel mode can't reach to master UPS from CAN bus. If UPS is operating, will be shut
82	Ext. Start Command	UPS which is operating in paralel mode has been given a command to start up by another (master) UPS.
83	Ext. Stop Command	UPS which is operating in paralel mode has been given a command to stop by another (master) UPS.
84	Ext. Switch To BYP.	UPS which is operating in paralel mode has been given a command to transfer the load to bypass line.
85	Ext. Switch To UPS	UPS which is operating in paralel mode has been given a command to transfer the load to inverter line.
86	Parallel Comm. FE.	Slave UPS which is operating in paralel mode has detected a failure of input current sharing.
87	Inverter OKEY	Inverter voltage reached needed value after UPS is started up. UPS can feed the loads through inverter.
88	Batt. Temp. Err.	Battery temperature is out of defined limits, batteries can be damaged.
89	Booster Overcurrent	Overcurrent in Battery mode, UPS will be shut down.
90	EPO key pressed	EPO key button is pressed.
91	Battery Low	Battery capacity has decreased below defined " battery low limit" while UPS was operating in battery mode.
92	No P.485 Bus Comm.	Parallel RS485 communication between the systems is not available.
93	STS OverCurrent	OverCurrent in Bypass line.
94	Output Signal OFF	UPS output breaker is turned off. Loads can not be energized.
95	BYP. Phase Rot. Err.	Reverse phase sequence was detected in mains at the UPS run time.
96	Fan Failure	Unable to communicate with the fan control system. Only for UPSs that contain the fan control system.
97	Output DC Volt. Fault	Over Inverter DC voltage. Loads will be transferred to the bypass line.

98	Battery Temp. Nor.	Battery temperature is normal.
99	Output Signal ON	UPS output switch is opened. Loads can be energized.
100	Fans Active	Able to communicate with the fan control system. Only for UPSs that contain the fan control system.
101	PFC Pbus OverVoltage	Positive DC Bus overvoltage.
102	PFC Nbus OverVoltage	Negatif DC Bus overvoltage
103	PFC PhL1 OverCurrent	Short circuit protection is activated for rectifier L1 phase.
104	PFC PhL2 OverCurrent	Short circuit protection is activated for rectifier L2 phase.
105	PFC PhL3 OverCurrent	Short circuit protection is activated for rectifier L3 phase.
106	Single Stop	Command to stop itself has been given to UPS which is operating in paralel mode separately from paralel system.
107	Master Changed	UPS became master device in paralel system.
108	Par. Bus ID Collision	ID value of one or more UPS is the same as each other in parallel system.
109	Output Offset Err.	One or more phase of slave UPS' output is not connected to master UPS in Parallel systems.
110	Bypass Short Circuit	Short-circuit current limit has been exceeded in the maintenance bypass mode. UPS is shut down.
111	RMS output Failure	The value of output voltage is out of the limits. UPS will be shut down.
112	Stop All Units	Stop all units command was given via front panel.
113	Float Charge Mode	UPS charge mode has switched to the standby mode at the constant voltage from constant current mode.
114	Pwr. Supply Fault	The error signal is detected on UPS through power source circuit debugger.
115	Generator Mode	Signal is detected from "generator mode input" of dry contact board. UPS will switch to "generator mode".

Alarms and Descriptions

	Alarm	Description of Alarm
1	Over Temperature	Over Temperature at the UPS units, Check the Status> Temperatures menu
2	Over Load	UPS is overloaded, reduce the load.
3	Bypass Bad	Bypass line voltage or frequency is out of limits, can not be bypassed.
4	UPS Stopped	
5	Charge Failure	The charging circuit problem is detected, batteries can not be charged. In the case of mains interruption, critical loads remain energized.
6	Fan Failure	Fan control board can not be reached, control will not be made.
7	Fuse Failure	Output Fuse is turned OFF.
8	Shutting Down	Stop command was given to the UPS, UPS will shut down at the end of the period.
9	No Battery	No battery detected.
10	M. Byp. Sig. Active	Maintenance bypass fuse is ON.
11	Static. Byp. Mode	UPS feeds the critical loads via bypass line.
12	Test is progressing	UPS is operating in the battery test mode.
13	Replace the batteries	At the end of the battery test, battery capacity was found to be insufficient. Critical loads remain energized, In the case of mains interruption.
14	Inverter Fault	Inverter voltage can not be created.
15	Battery Mode	UPS switched to battery mode.
16	Parallel. ID Conflict	There is more than one UPS with the same ID number at the system connected in parallel. Check ID numbers. In this case, the system can not be started.
17	No Parallel Comm.	UPS cannot communicate with the master UPS of the parallel system.

18	Low Battery	The battery capacity has fallen below defined limit in battery mode.
19	EKO Mode	UPS is operating in ECO mode.
20	Thyristor Failure	One or more thyristor is faulty. See the history logs for details.
21	BYP. Phase Rot. Err.	Bypass line phase sequence is not compatible with inverting the phase sequence.
22	Par. UPSMissing	Number of perceived UPS at the parallel system is not the same as number of set UPS.
23	Curr. Char. Err	One or more other phase of UPS is energized as different from other UPS.
24	Power Supply Failure	One of the power supplies that operates in paralel stopped.
25	Generator Mode	UPS switched to generator mode. Switching to generator mode command was given by dry contact board.

6. Technical Specifications

Technical Specifications						
Power	10kVA	15kVA	20kVA	30kVA	40kVA	60kVA
Active Power	8kW	12kW	16kW	24kW	32kW	48kW
Input						
Input Voltage Range	220 ± %15 (L-N) or 380 ± %15 (L-L) 3P + N + PE					
Input Power Factor	At Full Load > 0,99					
Input Frequency Range	50Hz ± 10% / 60Hz ± 10% (Adjustable)					
Rectifier	IGBT Rectifier					
Total Harmonic Distortion (THDi)	<%5					
Output						
Output Voltage Range	220/380 VAC (230/400 VAC adjustable) 3P + N ± 1% Static, ± 1% Dynamic					
Recovery	At 0% - 100% - 0% load, maximum output tolerance %5, %1 Back to band <40ms					
Efficiency	Up to %93					
Output Frequency Range	synchronous with the network at the range of 50Hz ±2% , mains when is out of range 50Hz ± 0,2%, battery mode 50Hz ± 0,2%					
Output THD (THDv)	Linear <%3					
	Non-Linear <%4					
Crest Factor (CF)	3:1					
Overload Capacity	At %125 load 10 min. , at %150 load 1 min.					
Protections	The input voltage is out of tolerance, input frequency is out of tolerance, input phase failure, output voltage is out of tolerance, output frequency is out of tolerance, output phase failure, DC component that can occur at the output voltage, Overload that will occur at the output (out of the periods specified), Overheating that will cause failure related to over temperature, high voltage which will occur at DC Bus voltage, low voltage which will occur at DC Bus voltage, short circuit at the output.					
Battery						
Quantity (12V DC VRLA)	28 - 50	38 - 50	48 - 50	50		
Charge Value (C)	Nominal 0.1 C, adjustable.					
Battery Power	25% of the device power					

Communnication						
Communication	RS232 Standart, RS485 and SNMP adapter option					
Dry Contact	Optional					
Protocol	Megatec, SEC, TELNET					
Certificates						
Quality	ISO 9001					
Standard	CE, TSE					
Safety	TS EN 62040-1-1, IEC60950					
EMC/LVD	TS EN 62040-2; A Class					
General						
Running Temperature	At the range of 0 °C ~ 40 °C (for batteries 0 ~ 25 °C)					
Storage Temperature	At the range of -15 °C ~ 45 °C (for batteries -10 ~ 60°C)					
Protection Class	IP20					
Chassis	Anti-Static Paint Protection					
Humidity	0-95 %					
Altitude	<1000m, Correction Factor 1. <2000m, Correction Factor >0,92, <3000m; Correction Factor >0,84					
Acoustic Noise (1m)	60dBA		65dBA			
Log Recording	500Event Log. (Optional Status Record)					
Parallel Operation	Parallel power increase up to 8 pcs.					
EPO (Emergency Power Off)	Standard					
Isolation Transformer	Optional					
Net Weight	115 kg	120 kg.	125 kg.	150 kg	160 k g	180 kg
Dimensions (W x D x H)mm	460 x 805 x 1190 mm					

7. CONTACT INFORMATIONS



www.makelsan.com.tr

İstanbul Deri Organize Sanayi Bölgesi 2. Yol, I -5 Parsel,

34956 Tuzla/ İstanbul

Tel: 0216 428 65 80 Faks: 0216 327 51 64 e-mail: makelsan@makelsan.com.tr

İzmir Şube: Hakapınar Mah. 1348 Sok. 2AE Keremoğlu İş Merkezi Yenişehir – İzmir

Tel: 0232 469 47 00 Faks: 0232 449 47 00 e-mail: izmir@makelsan.com.tr

MAKELSAN®

Uninterruptible Power Supplies

www.makelsan.com.tr

İstanbul Deri Organize Sanayi Bölgesi 2. Yol, I -5 Parsel,
34956 Tuzla/ İstanbul

Tel: 0216 428 65 80 Faks: 0216 327 51 64 e-mail: makelsan@makelsan.com.tr

İzmir Şube: Hakapınar Mah. 1348 Sok. 2AE Keremoğlu İş Merkezi Yenişehir – İzmir

Tel: 0232 469 47 00 Faks: 0232 449 47 00 e-mail: izmir@makelsan.com.tr